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THE AUSTRALIAN AND NEW ZEALAND JOURNAL OF SURGERY

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APRIL, 1939.

No. 4.

JOHN HUNTER AND HIS MASTERPIECE.

By K. F. RUSSELL,
Melbourne.

JOHN HUNTER, that very human Scotchman who did so much towards making the craft of surgery into a science, thereby raising the status of its exponents, is well known to all. As one of his contemporaries said: "He alone made us gentlemen." His enormous and unbounded energy has as its memorial the wonderful collection which was acquired by the nation and housed in the Royal College of Surgeons, England.

As William Lawrence, F.R.S., wrote in 1816:

Mr. Hunter is the glory of England in this century. In vigour and originality of genius, in comprehension and depth of thought, in unwearied industry, he has been surpassed by none. He was one of the men who give a character to the age in which they live—whose names are associated with the great eras of science—and who do honour to the country which produced them.

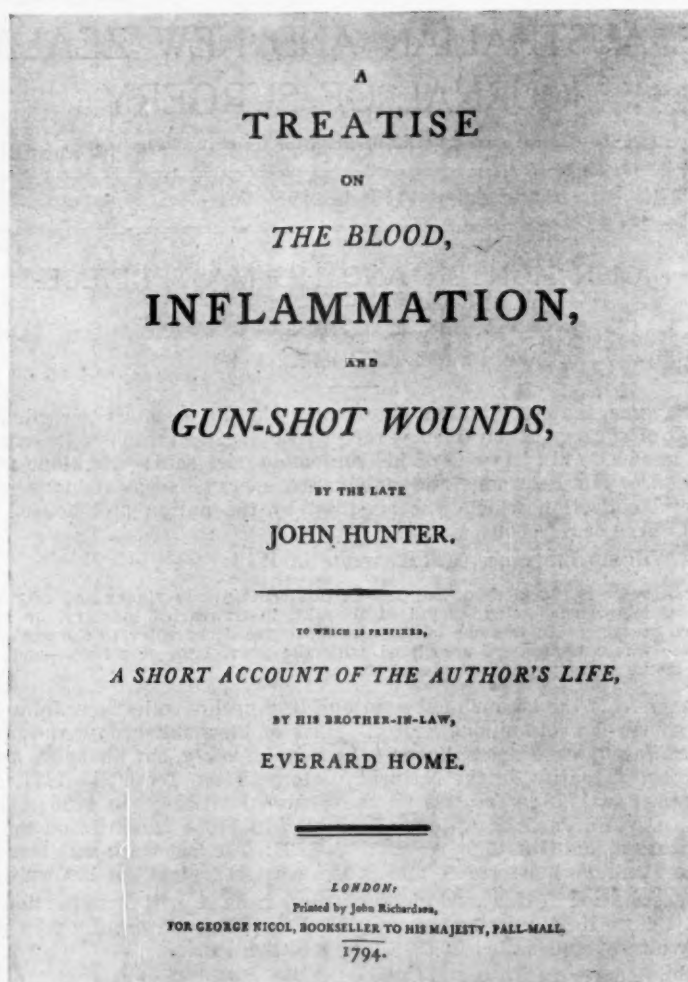
Apart from the labour of love in building up his collection, John Hunter was a somewhat voluminous writer. Most of his published works appeared in the *Philosophical Transactions of the Royal Society*, but his books appeared as follows: "Treatise on the Natural History of the Teeth" in 1771, and its second part in 1778; "Treatise on the Venereal Disease" in 1786; "Observations on Certain Parts of Animal Economy" in 1786; "Treatise on the Blood, Inflammation, and Gun-Shot Wounds" in 1794. The last work may be regarded as John Hunter's masterpiece and is the most "surgical" of his writings.

A description of this work, with extracts from it, will form portion of this paper. Before its discussion, however, I wish to draw attention to a piece of villainy almost unequalled in the history of medicine.

John Hunter in July, 1771, married the eldest daughter of Mr. Robert Home, surgeon to Burgoyne's regiment of light horse, thereby gaining as brother-in-law Mr. Everard Home. This latter gentleman, who was subsequently Sir Everard Home, forms the villain of the subsequent discussion.

After John Hunter's death in 1793 his collected manuscripts were at some unknown date subsequent to this burnt by Home, who, as well as his brother-in-law, acted as Hunter's executor together with Dr. Baillie. The

news of his act of vandalism was apparently not known officially by the College of Surgeons until some time in 1826. The following contemporary notice appears in a small octavo volume printed in 1826, entitled "A Corrected



Report of the Speeches Delivered by Mr. Lawrence as Chairman at Two Meetings of Members of the Royal College of Surgeons held at the Freemanson's Tavern":

We now learn, for the first time, in an official form, the disastrous intelligence, that Mr. Hunter's manuscripts have perished; that they have been wilfully and

deliberately burned by his brother-in-law and executor Sir Everard Home. Our regret for this irreparable loss is heightened by learning that the manuscript lectures, which Mr. Hunter read to his class were involved in the destruction, and that the writings were altogether so extensive, that ten volumes in folio on the anatomy of animals and vegetables are spoken of only as forming a part. A promise made to Mr. Hunter, to burn all his manuscripts is alleged in justification of this act. So injurious to the cause of anatomical and physiological science, and so detrimental to the important national collection, which the perpetrator was more especially bound to watch over and protect; not only from respect to the memory and fame of his deceased friend and near connection, but from regard to the interests of science, and in execution of his duty as one of the Curators of the Museum. The Council observe that Mr. Hunter considered these books to be valuable, and not otherwise than creditable to himself, may be inferred from three of them having been placed on the table beside him, when his portrait was painted by Sir Joshua Reynolds.

That Home burned an enormous quantity of material is to be inferred from the fact "that the escape of burning fragments from the chimney caused an alarm of fire, in consequence of which the dwelling of Sir Everard was actually entered by the firemen".

During the years 1814 to 1828 Home published a six-volume work entitled "Lectures on Comparative Anatomy", and in this discussion on his action two very pertinent questions were asked: "Was the destruction of these papers perpetrated before Sir Everard Home had completed his own volumes on Comparative Anatomy, and furnished his numerous contributions to the Royal Society?" "Were any of the destroyed papers on the subjects which Sir Everard has treated of?" It would seem not unlikely that Home actually did pirate John Hunter's work and published it as his own, but this of course will never be proved because the necessary evidence has perished in the flames. The above villainy does not fit in very well with the motto appearing on the coat-of-arms as seen on the bookplates of Mr. Robert and Sir Everard Home, reproductions of which figure in this paper.

As John Hunter died in 1793, he never lived to see his "Treatise on the Blood, Inflammation and Gun-Shot Wounds" through the press. This task was performed by his brother-in-law. Prefaced to the book there are a sympathetic biography of Hunter by Home and also a valuable account of



Hunter's *post mortem* examination, extracts from which will close this paper.

On the subjects with which it deals this book is a veritable mine of information, all showing the wonderful experimental acumen of John Hunter and also showing that many of his discoveries were very many years ahead of his time. His knowledge on gun-shot wounds was gained in Bellisle, where he was one of the surgeons to the expedition, a very interesting account of his experiences there being recounted in Volume xxiv of *The British Journal of Surgery*.

In the section on gun-shot wounds he very clearly laid down the different appearances of the wound due to bullets of varying velocity, and also the difference between entry and exit wounds. His criteria for enlarging, by operation, the gun-shot wounds are very sound and follow the usual principles of surgery. They are:

1. If inflammation be certain and the wound too small for drainage.
2. Involvement of a vessel in the wound.
3. In wounds of the head because of the dangers of involvement of the skull.
4. For extraction of pieces of shattered bone in situations other than the skull.
5. For extraction of foreign bodies.
6. For replacing protruded viscera.
7. For the relief of pressure on some vital structure.



The signs, symptoms and complications of perforated wounds of the chest and abdomen are clearly defined, but, needless to state, treatment in such conditions is empirical. He makes one interesting statement which leads one to think that ruptured spleen in those days was a very rare occurrence or rather one seldom diagnosed:

A wound of the spleen will produce no symptoms that I know of, excepting, probably, sickness, from its connection with the nerves belonging to the stomach.

In the opening of abscesses he recommends the introduction into the incision of a piece of lint soaked in salve, both to prevent early healing and also to promote drainage.

His chapters on inflammation are an epitome of knowledge up to his time, together with many experiments of his own. The latter include experiments on the tryptic power of pus, on the reasons for healing by first and second intention, on the dilatation of vessels by inflammation and many others. He clearly distinguishes between erysipelas and other types of inflammation, and mentions the involvement of the ear in the former condition.

His chapters on the blood contain records of a host of very interesting experiments. They include observations on the rapidity of coagulation in a dish as opposed to that in a blood vessel, on the yellow colour of the serum in jaundice, on the laking of red blood corpuscles in water, on means to prevent coagulation, including the use of Glauber's salt as an anticoagulant, on the

presence of a heat coagulable substance in serum. His experiments on tissue transplantation include the transplant of a spur of a cock to the comb, the grafting of a cock's testis into the abdominal wall of a hen, and many others.

In his chapter on the muscular and elastic properties of vessels he makes a statement, far ahead of his time, on the action of muscles.

The elongation of the muscles of the bladder, from the distension of urine, becomes the means by which they are excited to recover themselves so as to renew their action.

One of his experiments is worth quoting completely, for in it he discovered the alteration of the sedimentation rate of the red corpuscles in inflammatory conditions. This was rediscovered and put to its modern use by Fahraeus (1918-1921), Linzemeier (1920) and others. The fact that it was John Hunter's discovery has not been fully realized.

As inflamed blood leaves a portion of the coagulating lymph free from the red globules at the top, and as that can be accounted for upon the principle of coagulating lymph, in such cases not coagulating so fast as when the blood has not this appearance, and as the coagulation hinders any comparative experiment respecting the weight of the red globules of each, I tried to see if they sank in serum faster in the one kind of blood than in the other; I took the serum of inflammatory blood, with some of the red part, and also some serum of blood free from inflammation, with nearly the same quantity of the red part; they were put into phials of the same size; I shook them at the same time, then allowed them to stand quiet, and observed that the red globules subsided much faster in the inflammatory blood than in the other. To ascertain whether this arose from the red globules being heavier, or the serum lighter, I poured off the serum from each, as free from red blood as possible, then put the red part of the one into the serum of the other, and shook them to mix them well; and, upon letting them stand quiet, the red globules appeared to fall equally fast.

It will be remembered that in 1767 Hunter inoculated himself with syphilis in order to study the effects of the disease and its cure. Although he himself thought that he had cured the condition, it would appear from the account of the *post mortem* examination that it was the cause of his death.

The aorta immediately beyond the semilunar valves had its cavity larger than usual, putting on the appearance of an incipient aneurism; this unusual dilatation extended for some way along the ascending aorta, but did not reach so far as the common trunk of the axillary (subclavian) and carotid arteries. The internal membrane of this part had lost entirely the natural polish, and was studded over with opaque white spots, raised higher than the general surface.

There was evidence of previous coronary thrombosis in the form of fibrous patches in the ventricular walls, the coronary arteries were calcified, the aortic valves "had lost their pliancy . . . and in several spots there were evident ossifications".

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THE GOITRE PROBLEM, WITH SPECIAL REFERENCE TO ÆTIOLOGY AND TREATMENT.

By T. E. VICTOR HURLEY,
Melbourne.

In order to regard the subject of goitre in its proper perspective, it is helpful to review the stages through which our present knowledge of this disease and its treatment has been reached. I propose, therefore, to confine my attention to some of the factors in its ætiology, only so much of the pathology as is necessary in discussing treatment, and to the general principles of operative technique.

ÆTIOLOGY.

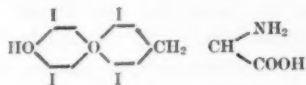
Geographical Distribution.

One of the outstanding features of goitrous disease is its high incidence in certain localities or districts. Some of the localities where the disease is especially prevalent are Derbyshire, the Swiss Alps, the Himalayas, the Mississippi Valley, and certain areas in New Zealand, Victoria and Tasmania. Such an unusual incidence has naturally directed attention to the possibility of local variations of soils, food, water and climate in these districts, and of these the iodine factor has chiefly been investigated.

Iodine Factors.

Several observations from various points of view have pointed to the conclusion that iodine plays an important part in the function of the thyroid gland and in the causation of goitre. Briefly, the facts are as follows: (1) As far back as 1820 a general physician, Coindet, of Geneva, noted the beneficial effect of extracts of seaweed and marine products and of iodine on goitre, and wrote a paper on the subject. He also noted the occurrence of symptoms of toxæmia in patients after prolonged treatment with iodine. (2) Chatin, of France, in 1850, made similar observations, and also found that all arable soils contained iodine in varying amounts. This finding has been confirmed by subsequent investigators, and most recently by Hercus⁽¹⁾ and Drennan⁽²⁾ in New Zealand. (3) In 1895 Baumann discovered iodine in the thyroid gland, and found that the percentage of iodine in goitrous thyroids was considerably reduced. (4) The thyroid gland seems to act as the storehouse of iodine in the body, and contains more iodine than all the rest of the body; of a total amount of 25 to 30 milligrammes present in the body, the thyroid contains a proportion variously estimated at from 40% to 90%. It will be seen that the amount of iodine involved is extraordinarily small, being measured in terms of milligrammes. (5) In 1914 Kendall⁽³⁾ isolated thyroxin, the active principle or hormone of the gland,

and found it to contain a high percentage of iodine. (6) In 1926 Harington⁽⁴⁾ synthesized thyroxine in the laboratory, found it to contain 65% of iodine, and represented its chemical composition as follows:



(7) The well-established observations of recent years show the striking effects of the administration of iodine to goitrous patients. These are shown in the production under iodine treatment of easily recognizable and marked changes in the microscopic appearances of goitres, and also correspondingly marked temporary amelioration of the toxæmic symptoms and signs associated with them. This aspect of the action of iodine will be discussed later.

Some of the other possible factors in the causation of goitre which have been advanced have been as follows.

Microbic or Infective Factors.

McCarrison,⁽⁵⁾ Marine⁽⁶⁾ and others have suggested that contamination of water supplies may cause goitre, and have supported these views by experimental work on animals. Later investigators, however, have failed to find any connexion between contaminated water supplies and goitres. Farrant⁽⁷⁾ and Cole have shown that acute infections, such as tonsillitis, in the human subject quickly produce definite histological changes in the thyreoid. It is probable that infections and toxæmias, by depleting the iodine present in the thyreoid, may contribute to produce an iodine deficiency.

Vitamin Factor.

Mellanby⁽⁸⁾ produced goitres in animals by feeding them with a diet with an excess of butter but without iodine, while in control animals fed with excess of fat in the form of cod liver oil, which has a high iodine and vitamin content, goitres did not result.

Relationship with Other Ductless Glands.

In all countries there is a higher incidence of goitre in females as compared with males, and the enlargement of the thyreoid at periods of special activity of the reproductive organs in the female, such as puberty, pregnancy and lactation, is familiar to all. Although the enlargement of the gland most often subsides when the period of activity is over, in a certain proportion of cases it does not do so, and progressive changes continue.

Relation with the Pituitary Gland.—Recent work by Collip, Anderson and others points to the anterior lobe of the pituitary gland as having a special influence on thyreoid function by means of a thyreotropic hormone. It seems to be a general law of the endocrine system that removal or destruction of an endocrine gland which makes a tropic hormone causes atrophy of the gland upon which that hormone acts. Also, removal of an endocrine gland for which another gland makes a tropic hormone causes hyperactivity of the latter gland; for instance, removal of the anterior portion of the pituitary gland causes atrophy of the thyreoid and gonad, whereas removal of the

thyreoid or gonad causes hyperactivity of the anterior portion of the pituitary. Extirpation of the pituitary gland thus leads to some atrophy of the thyreoid, while continued injections of extracts of the anterior lobe of the pituitary in animals cause hypertrophy of the thyreoid and an increase in the basal metabolic rate. This reaction lasts for five or six weeks, after which the basal metabolic rate is diminished.

A further remarkably interesting observation has been made, in that if the serum of these animals that have been submitted to injection be now injected into hypophysectomized rats, these do not show the hyperplasia of the thyreoid or the increased basal metabolic rate which is normally produced by the thyreotropic hormone. The thyreotropic hormone acts independently of nerve impulses and stimulates thyreoid cells *in vitro* and in transplants. It has been suggested that we may thus be able to produce a serum which could be used in the treatment of thyreotoxicosis. A further suggestion has been made that it may be the hypothalamus which governs the production by the anterior portion of the pituitary of the thyreotropic (and also an adrenotropic) hormone.

Another observation has been made which has some bearing on the curious phenomenon of exophthalmos. No satisfactory explanation of the mechanism of the production of exophthalmos has so far been afforded, and often it does not run parallel with other symptoms and signs of thyreotoxicosis. In fact, exophthalmos sometimes persists unaltered or is actually increased after thyreoidectomy. It has been observed that injection of thyroxine alone cannot produce exophthalmos, but if it is given with adrenaline or ephedrine, exophthalmos is produced and, still more curiously, that this occurs more readily after thyreoidectomy. It is thus suggested that the thyreotropic hormone or adrenotropic hormone may be of greater importance than thyroxine (whether normal or pathological) in producing exophthalmos.

A Working Theory of the Causation of Goitre.

Although there are still many gaps in our knowledge, the present position regarding aetiology may briefly be summed up as follows.

The function of the thyreoid is closely concerned with the utilization of oxygen by the tissues, and in this thyroxine plays an important part. We try to assess this when we estimate the basal metabolic rate. For the production of thyroxine in amounts adequate to the needs of the body, an adequate intake of iodine is essential (40 microgrammes daily). The supply of iodine to the thyreoid is dependent on adequate absorption and assimilation of iodine, and disordered function of the gastro-intestinal tract or bacterial action may interfere with this. Only a very small fraction of the circulating iodine is withdrawn by the thyreoid. If there is an obstacle to the manufacture of hormone, an increased supply of iodine will, up to a certain point, overcome the obstacle. The iodine requirement of the thyreoid depends on the demands made by various cells of the body for thyreoid secretion, and these may vary with age, sex, sexual activity, infections, nervous influences *et cetera*. There is also the functional efficiency of the thyreoid itself as a secretory organ to be considered, and such factors as heredity and excessive stimulation by nervous or toxic agents may be involved. While, therefore, it may be true that goitre may arise because of deficient iodine intake, it is

more likely to arise when a number of factors combine to render the available iodine in the food relatively insufficient for the needs of the body, and the relative importance of each of these factors may vary considerably in different localities and at different times.

THE PATHOLOGICAL CHANGES PRODUCED IN THE THYROID GLAND.

As thyroxine is used up in the tissues, demands are made on the thyroid to replenish the supply. This results in a decrease of the stored colloid in the gland and an increased blood supply. If the thyroid is unable to cope with the demand, or the raw material containing iodine is not supplied in sufficient quantity, hyperplasia of the thyroid secreting cells occurs, and if this is sufficiently marked the gland can be seen to be enlarged; that is, a goitre develops. If the demands are severe or prolonged, the gland contains a reduced quantity of iodine (Hercus and Drennan) and produces a secretion deficient in iodine; this is possibly an incompletely synthesized product which is capable of producing disordered function in various tissues of the body, and so causing the symptoms and signs of thyreotoxicosis. The boundary line between physiological response and pathological enlargement of the gland is not well defined to begin with, and needs for its definition a recognition of the early symptoms and signs of disordered activity and function. In these early stages the position may be rectified by appropriate treatment, or even by none at all, except possibly symptomatic treatment and the use of mild sedatives, reliance being placed on the recuperative power of the thyroid cells to adjust the situation. Later, if the stimuli to continued thyroid overactivity persist, they set up a process which passes out of effective control. The only remedy that consistently has a direct influence in correcting this turn of affairs is the administration of iodine, which causes a check in the process with amelioration of the toxicity of the thyroid secretion. Concurrently with this, microscopic examination shows that the colloid which had largely disappeared from the pathological gland now reappears under iodine therapy, and the gland shows a more or less normal microscopic appearance. In effect, an artificial remission has been produced. This phase is, however, temporary: reaches its maximum in one or two weeks and lasts for about six weeks. If iodine administration is continued, it leads to a return and aggravation of the toxæmia, which is progressive and uncontrollable. The reason for this is unknown.

A discussion of the detailed histological appearances of the various types of goitres is beyond the scope of this paper. It can, however, be stated that our present conception is that there is an essential unity or common factor at work in the causation of goitres in general, and that the different manifestations or types arise according to the kind or intensity of the stimuli, the age of the patient, and so on. In general, it may be said that adenomatous or nodular goitres develop by a continuance of the same changes as can be seen in parenchymatous or colloid goitres, and that all stages in the process can be recognized. Usually several years elapse between the first appearance of the goitre and the formation of the fully developed, firm, irregular nodular goitre. This type is usually met with in older people, and is particularly liable to produce myocardial damage and cardiac complications.

In the more rapidly developing exophthalmic type usually met with in younger people, there is no single characteristic alteration in the histological

picture that may not be found in some portion of a toxic adenomatous gland. As might be expected from its more rapid development, epithelial hyperplasia is more marked and colloid storage less. Reinhoff⁽⁹⁾ is of the opinion that it is an open question whether the proliferation of an exophthalmic goitre can develop from a previously normal thyroid gland.

In attempting to classify goitres many cases will be found in which the gland shows a gradual transition from one type to another, and others in which areas of more than one type are present, and it is not therefore possible to associate a definite clinical picture with a definite histological appearance of the affected gland.

The Changes Produced in the Goitrous Gland when Iodine is Given.

The changes following iodine administration can usually be seen on microscopic slides and may be summarized as follows:

1. Marked increase of colloid.
2. Increase in size and regularity of the acini.
3. Decrease in size of the epithelial cells.
4. Decrease in the vascularity of the gland and lymphocytic infiltration.

In brief, the cellular hyperplasia of the toxic gland is transformed back to a resting or colloid state like that seen in a normal gland.

Contrary to what Plummer originally stated, iodine does produce a definite effect on most goitres, and on the toxic adenomatous (secondary toxic goitre) as well as the exophthalmic variety (primary toxic goitre). Cases are, however, occasionally met with, particularly in toxic adenomata, in which resistance to iodine is present and in which the expected amelioration of toxæmia under iodine treatment fails to occur. Microscopic slides also show that the so-called adenomata are really areas of local increased epithelial overgrowth in a gland which elsewhere is not normal, and that these areas are separated by increased fibrous tissue or septa, so that an irregular or nodular gland results.

THE PLACE OF IODINE IN TREATMENT.

Historical.

The history of the use of iodine in the treatment of goitre is a fascinating chapter in medical history. In the thirteenth century a specific remedy containing burnt sponge and seaweed (containing iodine) was vaunted as a cure for goitre, and this was also referred to by Valescus de Taranto in 1418, and by Musitanus in 1698. In the middle of the eighteenth century it appeared in England as the "Coventry treatment" for goitre, which had a great vogue, and remained a family secret until it was divulged by Dr. Wilmer in 1779. The recipe was then shown to be an almost literal translation of that of Musitanus.

In 1813 Gay-Lussac discovered and named iodine, and six years later this new element was shown by Fyfe to be present in the ash of the common sponge. In the same year (1819) Coindet conceived the idea that this element, newly discovered in seaweed, might be the active principle of the time-honoured burnt sponge remedy. Iodine was given by Coindet either in

solution as potassium iodide or as the alcoholic mixture, the dose being 0.06 to 0.3 gramme (1 to 5 grains) of iodine daily, increasing after a week to 0.136 gramme (2.25 grains) and later 0.2 gramme (3 grains). Under this treatment many goitres diminished in size and some disappeared, but it soon became apparent that so drastic a therapeutic agent had its dangers, and in his second memoir Coindet (1820) emphasized the need for caution in its use. He stated that the total amount of iodine required for treatment should not exceed 57 grammes (two ounces), and that the appearance of untoward symptoms, such as palpitations, tremors, wasting *et cetera*, should be the signal for immediately stopping the treatment. His later warnings were, however, neglected, and much harm resulted from the overuse of iodine, so that Gairdner wrote in 1824:

So great have been the ravages committed by the imprudent use of iodine in the Pays de Vaud, that the government of that canton has issued an injunction against its sale, excepting under the signature and responsibility of a physician.

For similar reasons the government in New Zealand was asked some years ago to forbid the sale of popular goitre cures containing iodine. Nevertheless, Gairdner himself was convinced that iodine, properly handled, was a drug of the greatest value. It is extraordinary, but not unique in medical history, that the true position, having been once so clearly recognized, should have been forgotten and "rediscovered" several times in the next hundred years. Chatin in 1850 traversed much the same grounds, Kocher in 1910, and later Plummer and others.

Indications for the Use of Iodine.

We thus see that the beneficial results of iodine in cases of goitre have been known for a very long time. The ease of administration and the prompt and obvious improvement in the toxæmic symptoms and signs are, however, dangerous, because the remedy is often used indiscriminately in unsuitable cases, and for long periods in others after the initial improvement has ceased.

I think it may be conceded that in the early diffuse smooth enlargements, especially those occurring at puberty or during pregnancy, the use of iodine, preferably as Lugol's solution or potassium iodide, cannot be denied to physicians, provided that patients are kept under close observation, and that the dangers of continued iodine treatment are realized. It is advisable to give the iodine for short periods of, say, two or three weeks at a time, with intermissions, and the results carefully observed. Such thyroid enlargements, or overworked thyroids, if they have been present for a few months only, may thus settle down with a medical regime which also includes rest, removal of foci of infection and sources of worry, adequate diet, sedatives, and often the administration of thyroid gland to make good the patient's inability to meet the requirements of the body for thyroid secretion.

The nodular or adenomatous types of goitre develop usually as a later stage of the smooth diffuse enlargements, and iodine will not cure these. These are the cases in which the chief danger lies. Iodine should not be used in adenomatous or exophthalmic goitres except as a preliminary to operation in a dose of 0.3 or 0.6 cubic centimetre (5 to 10 minims) of tincture of iodine or of Lugol's solution thrice daily. The wider recognition of this valuable but restricted use of iodine in treatment has been one of the chief factors in the improvement of surgical results in recent years.

Not only do patients who have been overtreated by iodine before being seen by the surgeon show increased evidence of toxæmia, but their thyroids are harder and more nodular, inelastic and friable, than they would otherwise have been, making operation more difficult and dangerous. Even if the iodine administration is stopped, the symptoms of toxæmia do not subside, and the gland will not again respond effectively to iodine even after a long period of abstention from it, so that at the time of the operation, which by now is obvious to all as the only hope for the patient, the surgeon is deprived of one of his most valuable weapons.

Means's Views.

The views recently put forward by Means, from the thyroid clinic at the Massachusetts General Hospital, are rather different from those which have just been stated. He states that the action of iodine on patients with toxic goitres is not due to neutralization or alteration of the thyroid hormone by iodine in the blood stream. He also states that, as long as thyreotoxicosis exists, a response to iodine can be elicited at any stage of the disease, provided, of course, that the patient is not already under the influence of the drug. He considers that patients who are becoming more thyreotoxæmic while taking iodine do so not because of refractoriness to the drug; they are still getting the benefit of some amelioration from the iodine, and they are not out of iodine control. In Means's opinion intensification of thyreotoxicosis under iodine therapy represents the natural course of the disease, and would be greater in degree if iodine were not given. Continuous taking of iodine simply causes the thyreotoxicosis to follow a lower level than would otherwise obtain, and if iodine administration is stopped the patient becomes worse. During escape from iodine control the rate of return of symptoms and increase of the basal metabolic rate are approximately the same as that of their decline when the patient is first put under the influence of the drug. Means compares the giving of iodine in toxic goitre to putting on the brake of a running motor car without moving the accelerator (the cause of thyreotoxicosis).

Toxic goitre is a disease with a tendency to remissions and relapses, and although it may be on the up or the down grade at the time iodine is given, iodine will at any moment decrease the thyreotoxicosis to a more or less predictable extent. In Means's experience the response to iodine is a cardinal feature of thyreotoxicosis, and a positive response to iodine as estimated clinically and by repeated estimations of the basal metabolic rate occurs in 96% of patients. Any of the cardinal features may, however, be lacking in any given case. The patients who fail to respond to iodine therapy carry an increased operative risk.

The remission produced by iodine is often as rapid and as extensive as that following subtotal thyroidectomy, and daily records of the basal metabolic rate show very similar progressive reduction in each. After a patient with exophthalmic goitre has been taking iodine a rapid rise of basal metabolic rate and increase of toxæmic symptoms will occur within one or two weeks if the iodine is discontinued.

In a series of Means's cases the decrease in basal metabolic rate under iodine averaged three to four points daily, the rate falling from an average of 48% to 10% in eleven days.

When the diagnosis of toxic goitre is in doubt, one may: (1) Wait and see. (2) Give iodine and look for the characteristic response. (3) In a patient already under iodine, stop it and note if the toxæmic symptoms return.

Iodine is also valuable after operation to determine if the condition of thyrotoxicosis still smoulders on. Recurrent thyrotoxicosis may be masked if the patient is taking iodine.

On the question of the dosage of iodine, Means has estimated that the quantity of iodine needed daily is about 0.16 milligramme. The doses usually given, one to four cubic centimetres (15 to 60 minims) of Lugol's solution daily, are relatively enormous, and are the equivalent of 100 to 400 milligrammes of iodine daily.

After experimenting with various dosages, Means found that one minim daily (six milligrammes of iodine) of compound solution of iodine (Lugol's solution) was the smallest dose which would with any certainty produce a maximum response. After response to the dose of 0.06 cubic centimetre (one minim), larger doses produced no additional response. The curves of the daily basal metabolic rate and pulse rate of patients receiving 6.0 cubic centimetres (90 minims) daily and those receiving 0.06 centimetre (one minim) daily were nearly identical, that is, no increase in response was given by greatly increasing the dose.

Prophylaxis.

On the basis that a deficient iodine intake is the primary factor in the causation of goitre, prophylactic measures have been largely used in goitrous areas during recent years. In some areas in Switzerland, school children are given each week a tablet containing one milligramme of iodine, with good results. In an investigation by Marine and Kimball in 1917 in Akron, Ohio, amongst 2,190 girls who were prophylactically treated for three years, it was stated that only five developed goitre, as against an incidence of 495 cases of goitre amongst 2,305 girls who were not treated. It has also been stated that the use of iodized salt by pregnant goitrous women prevents the birth of goitrous children. A convenient method of ensuring a regular supply of iodine is to add it to a common article of diet such as salt. The average daily intake of salt for all purposes is about five or six grammes, and if this is iodized so as to contain one part of potassium iodide to 250,000 parts of salt, it provides sufficient iodine. Means states that the adequate prophylactic dose is about 0.075 milligramme, and that the dose necessary to produce the toxic goitre response is about one hundred times greater than this.

In New Zealand in 1921, in two selected schools in Christchurch, a solution of sodium iodide was given to the school children once a week for ten weeks in each of the three terms of the year. The results five years later, in 1926, were regarded as satisfactory. In the Swiss canton Appenzell am Rhein, where iodized salt has been in universal use since February, 1922, the incidence of congenital goitre dropped from 50% to nil, and there were no ill-effects recorded on the potentially toxæmic adult population.

While these favourable results have been reported, it must be admitted that such have not been the experience of all observers, and it has to be remembered that there is a very real danger in the indiscriminate use of iodine in a community containing a large number of people with potentially toxic goitres.

TREATMENT.

Except for the early border-line cases already referred to, in which medical treatment under careful supervision may be employed, removal of the greater part of the pathological thyroid or goitre by operation is the most effective treatment in counteracting the toxic effects and restoring the patient to useful health. Operation is certainly indicated when symptoms and signs of toxæmia are definitely recognizable, or when the gland is nodular. Other methods than that of removal by operation have been suggested for ridding the body of the pathological secretion of such goitres, as, for instance, injections into the gland and X ray treatments. These are less certain in their action than surgical removal, which may have to be done later after these methods of treatment have failed to give the desired relief. X ray treatment may, however, be usefully employed in certain cases, particularly in milder cases recurring after operation and especially in young people. It is also useful in cases occurring during pregnancy to check the toxic process, even if only temporarily, and also in some mild atypical cases occurring at the menopause. In these latter, one not infrequently meets with cases of thyroid enlargement with symptoms of neurasthenia or vague ill-health with muscular weakness and fatigue. Nervous symptoms are often marked, but there is frequently no loss of weight, no increase in the basal metabolic rate and often no marked increase in the pulse rate. In such cases the results of operation are often disappointing; sometimes these patients are worse after operation, and others sometimes settle down either with or without operation in two or three years. A few of them go on to myxœdema. Mental disturbances are also sometimes a marked feature. There is little doubt that in these cases, occurring at or about the menopause, there is a general endocrine disturbance in which the thyroid participates. Careful medical supervision on general lines, together with a few X ray treatments, may steer such patients safely through this period. If the toxæmic symptoms progress, and it becomes evident that surgical treatment is necessary, it has been my experience that preliminary X ray treatments do not add appreciably to the difficulties of operation, and such patients are thus in marked contrast to those who have been overtreated with iodine.

Mention should also be made of cases with evidence of congestive heart failure, particularly met with in older patients. In those in whom a nodular goitre has been present for years, removal of the goitre can be relied on to give much relief, the degree of which will depend on the severity of the myocardial damage that has occurred. In some patients with auricular fibrillation the signs of congestive heart failure may overshadow the goitre, which may therefore be missed. This is especially likely when there is little or no palpable thyroid enlargement, though usually, if the thyroid is at fault, definite enlargement and evidence of its pathological nature are evident at operation when the covering muscles are held apart and the gland exposed to view. The possibility of a toxic thyroid may also be suggested in such cases by the failure of response to digitalis, and the absence of any other cause for the heart failure. Furthermore, there is usually only slight cardiac enlargement in the presence of toxic goitre, whereas in cases of heart failure resulting from hypertension or valvular lesions, the cardiac enlargement is generally demonstrable. The increased pulse pressure in cases of toxic goitre is chiefly due to increase of the systolic

blood pressure, and may sometimes suggest aortic regurgitation, except for the fact that cardiac enlargement is absent.

Operative Details.

The use of nitrous oxide and oxygen as the anæsthetic of choice in toxic patients and careful preliminary medical treatment with the use of iodine have in recent years completely altered the operative management and the patient's outlook. Operations under local anæsthesia are now rarely necessary, and the necessity for operating in stages has been greatly reduced. In more than 90% of cases the operation of thyroidectomy can be carried out at one sitting, and the mortality should not exceed 2% or 3%. In very toxæmic apprehensive patients the use of paraldehyde or "Avertin" as a basal anæsthetic preliminary to the nitrous oxide is valuable; not only is the patient spared the nervous ordeal of the approaching operation, but often the pulse rate drops after its administration and the reaction after operation is less severe. If it has been decided to stop after one lobe has been removed, it is usually possible and advisable to operate upon the other lobe about ten days later. By this means the whole operation is completed during one stay in hospital, and the possibility is avoided that patients with temporary or incomplete relief after the removal of one lobe may fail to return. Occasionally patients get an unexpected degree of relief for many years when only one side has been operated upon. One has operated on several such patients in whom intervals of ten to twenty years have elapsed before the return of sufficiently severe toxæmic symptoms requiring the removal of the other lobe. In one recent case after an interval of nineteen years the patient returned chiefly because of marked general pruritus which she recognized as similar to that existing before her first hemithyroidectomy. After each operation the pruritus disappeared within a week.

Surgeons have come to recognize that in patients with well-marked symptoms and signs of toxæmia it is necessary to remove practically all the pathological thyroid tissue, leaving only a small piece, a mere shaving, over the site of the parathyroids and the recurrent nerve on each side. Regrowth of these remnants sometimes occurs, requiring further operation. Some surgeons advocate even more radical removal in that all visible thyroid tissue in very toxæmic patients is removed; myxœdema is, of course, more likely to result, requiring the subsequent administration of thyroid extract, but this may be preferable to persistence of toxæmia in severe cases if any appreciable remnants are left behind.

The chief points of importance if good results are to be obtained are careful pre-operative preparation, gentle yet reasonably quick technique, effective hæmostasis, and the cooperation of an anæsthetist with experience in giving gas anæsthetics, who keeps the patient a good colour throughout, and not only knows in what condition and state of anæsthesia the patient is throughout the operation, but also how much he can rely upon the surgeon.

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WHEN TO OPERATE IN ACUTE APPENDICITIS.

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SURGEONS declare to the members of the medical profession and to the public that if operation for acute appendicitis is performed during the first twenty-four hours of the illness, the mortality is less than 1%. Sahli in 1890 collected records of 6,740 cases of perityphlitis in which expectant treatment was adopted, with a mortality of 591 persons or 8.8%.

After the first twenty-four hours have passed the problem in treatment is to decide what are the best means of preventing those who have lost their chance of coming within the less than 1% group from drifting into the 8.8% group, described by Sahli, or into a group with a still higher mortality.

If a delayed plan is to be followed at any period it is pertinent to ask what are the factors which should guide the surgeon. Apparently there are only three worthy of consideration: hyperæsthesia, the time factor and local signs.

In the consideration of this problem it is essential to bear in mind first of all the pathology of acute appendicitis, secondly clinical experience, and thirdly the published statistics of delayed and immediate operation.

PATHOLOGY OF ACUTE APPENDICITIS.

Wilkie, in 1914⁽¹⁾ and again in 1931,⁽²⁾ emphasized two primary acute diseases of the appendix: (a) acute inflammation of the wall, (b) acute obstruction of the lumen—a closed loop intestinal obstruction. Wilkie held that these diseases differed essentially in pathology, in clinical symptoms and in their danger to life.

The onset of acute inflammation of the wall is acute, but not dramatically so, and is associated with the usual constitutional symptoms, namely, a rise in temperature and in pulse rate and local signs. If these symptoms are treated conservatively they will very often subside, though they may lead to local abscess formation. Perforation of an ulcer due to a concretion can precipitate peritonitis.

Acute appendiceal obstruction, an intestinal obstruction of the closed loop type, leads to early gangrene. Wilkie pointed out that gangrene can and does occur from six to twenty-four hours onwards, and that it results in the spread of highly toxic faecal contents over the peritoneal cavity. The colicky pain and vomiting associated with this type are distinctive features. I have often thought that the closer the concretion is to the tip, the quicker the appendix is to perforate.

A clinical experience of these conditions teaches us that when inflammation commences in the wall the disease tends to be self-limited, with local abscess formation.

How often have we seen at any time from the second to the fourth day, a free or almost free gangrenous appendix ruptured or unruptured in the abdomen, and how often have we been struck by the absence either of adhesions from neighbouring coils of bowel or from the protective action of the omentum? There is, of course, no reason why we should see this action of the omentum in all cases of acute appendicular obstruction when we remember that it is not often seen in cases of acute intestinal obstruction of the small bowel. In acute obstruction of the small bowel perforation is not nearly so rapid because there is no foreign body tightly obstructing the lumen.

In my experience a gangrenous appendix situated in the pelvis is protected less by the omentum than when it is situated in other positions. I have no doubt that everyone here tonight can recall countless cases in which during the second or third twenty-four hours a perfectly free gangrenous appendix, ruptured or unruptured, has been lifted from the pelvis.

From this stage conditions pass to those in which either a local abscess or a spreading peritonitis is present; this occurs somewhere from the fourth to the fifth twenty-four-hour period, or earlier in acute cases in which early perforation has occurred. Clinical experience teaches us that because of occlusion of the lumen from swelling, the obstructive can be superimposed on the inflammatory type of lesion, and in these circumstances perforation is not so likely to occur on account of omentum wrapping.

All will agree that appendicectomy in the first twenty-four hours and to a large extent in the first forty-eight hours should carry a small mortality; in the first twenty-four hours few perforations will occur, though the number will rise in the second twenty-four-hour period. It is in the third and fourth twenty-four-hour periods that doubts have been expressed and figures have been published to support delayed operation by the well-known Ochsner-Sherren technique, which aims at localization of the peritonitis, with resolution or abscess formation.

CLINICAL EXPERIENCE.

Before referring to statistics, let us consider our own clinical experience of appendices perforated on the third day. The most damage comes from those situated in the pelvis and from those directed towards the left. In the former, if the condition is unlocalized, the pelvis becomes full of pus and soon overflows; in the latter a paralytic ileus often forms from gross inflammation of the mesentery proper, and from incorporation of the loops of the small bowel in the wall of the abscess cavity. Appendices perforated on the third day and situated in the right iliac fossa, or behind or lateral to the caecum, are not so dangerous or so liable to cause a spreading peritonitis. Those lying in the right iliac fossa are commonly wrapped in omentum, while those lying behind or lateral to the caecum are frequently overlaid and localized by the voluminous wall of that viscus.

There is most to fear from the appendix perforated on the third or fourth day, lying in the pelvis or directed to the left. In these circumstances apprehension must increase as the inflammation spreads.

Clinical experience shows that appendicitis in the aged often runs a course which renders expectant treatment impossible. The symptoms are often those of subacute intestinal obstruction. With nearly worn-out tissues the reaction of the temperature and the pulse rate is slow, and in pelvic

cases the local signs are ill-defined. These are the outposts of the expectant campaign; if they are asleep the party is ambushed, and wherever the delayed treatment has a place, it has none in the treatment of acute appendicitis in the aged.

In those cases of acute appendiceal obstruction in which perforation occurs before localization by omentum and coils of bowel, it is pertinent to ask whether all the soiling and damage has been done at the time of perforation. I suggest that there are some cases, especially those in which a concretion has escaped and left a perforation close to the appendico-caecal junction, in which it is just as unreasonable to expect the patient to recover without closure of the perforation and drainage of the peritoneum as it is in perforated gastric or duodenal ulcer. Are we confident that in this type reinfection does not from time to time occur?

Difficulty in diagnosis has in private practice given me experience of appendicitis of three days' duration. My last two cases are instructive.

W.I.N., a male patient, aged forty years, was seen on April 26, 1937, twelve hours after the acute onset of abdominal pain, vomiting and diarrhoea; this followed the eating of fish, and two other persons in the house were affected. Twenty-four hours after the onset of symptoms his temperature was 38.9° C. (102° F.), his pulse rate was 120, and tenderness was present in both the left and right iliac fossae. When I saw him a little later, tenderness was present on rectal examination, but no mass or localization of tenderness could be detected. His tongue was dirty and his breath was foul. On April 27, 1937, his general condition was better, but his temperature and pulse rate were the same as on the previous day.

On April 28, 1937, his temperature was 36.7° C. (98° F.), his pulse rate was 96, and all his pain had gone. His tenderness was localized to the right iliac fossa, and on rectal examination extreme tenderness was found on the right side. Immediate operation was undertaken. An appendix, gangrenous from end to end and not enclosed in omentum, was with difficulty removed without rupture.

The surgeon can find himself in situations of this kind because of an unusual onset, and while they are disconcerting, they give us knowledge of the progress of the disease. Although the temperature and pulse rate had subsided and the patient's general condition improved, there was a free gangrenous appendix on the point of rupture. The abdomen was drained and the patient recovered.

A male patient, aged twenty-five years, suffered from a very acute appendicitis of three days' duration. Pain at the onset was situated in the centre of the abdomen and later on became localized in the right iliac fossa. Four hours before I saw him, and three hours before he was seen by the local doctor, the severity of the pain increased dramatically—it was generalized and the patient could not lie still in bed. There was no vomiting. The patient's temperature was 37.2° C. (99° F.), his pulse rate was 108, and his abdomen was as rigid as that of a patient with a perforated gastric ulcer, although the most severe tenderness was present in the right iliac fossa. Immediate operation was undertaken. Free fluid, which was not offensive, was found to extend to well above the umbilicus, and the peritoneum was almost scarlet red. The appendix was gangrenous, but no longer turgid; and although I could not see the perforation even when the appendix was removed, I feel confident that it had leaked and fouled the peritoneum, and was on the point of still further repeating the process. The abdomen was drained and the patient recovered.

Can we estimate perforation time and, if so, can we decide whether the perforation will be localized or free into the peritoneal cavity? I think that perforation time is dependent on one of two factors, which may be associated. These are inflammation in the wall and the degree and rapidity of the obstruction with resulting increased tension. I am often unable to estimate

which is the more important factor—how soon perforation will occur or whether perforation will be localized. In these circumstances, until a mass without a spreading peritonitis is evident, immediate operation is indicated.

STATISTICS OF THE DELAYED AND IMMEDIATE OPERATION.

What is the case made out by statistics for the delayed method of treatment? The figures of McNeil Love⁽³⁾ are well known to everyone; but close inspection shows that in those figures there is nothing to indicate age incidence. We have seen that delayed treatment is contraindicated in the aged, and this applies also to the young. In the aged it is contraindicated for the reason already given; there are those who can speak more emphatically than I for the younger patient. Even the enthusiasts of the delayed treatment exclude children and the aged.

Nuttall⁽⁴⁾ reanalysed McNeil Love's figures and was able from a table giving the age incidence of the deaths to arrive at the number of deaths in each decade, although there is no age incidence in Table I. When the deaths in the first two decades and in those patients over fifty are excluded (and the young and old are unsuitable), the figures shown in McNeil Love's table assume very different values.

All have been emphatic in their statements that the delayed treatment must be carried out in a hospital; in fact, almost at the door of the operating theatre. The ideal conditions are that the surgeon should live in the hospital and be ready to operate at a moment's notice if an increase in pain, pulse rate or local signs gives the indication. This is not possible in civil surgery in many countries today.

Unless a mass unaccompanied by a spreading peritonitis is present, all patients with acute appendicitis require urgent surgical treatment. Is it safe to leave all cases in which a mass is palpable? Emphatically no. Judgement must be based on the local signs in the abdomen; the abscess can give rise to a spreading peritonitis and that is an indication for evacuation and drainage.

Why the figures are so good for those cases in which localized abscesses have formed under the conservative treatment is, I suspect, because by the seventh to tenth day even the most optimistic and the most foolish decide that drainage is all that can be accomplished, and little, if any, operative damage is done. This, I regret, cannot be said for the third-, fourth- and fifth-day cases. The third-, fourth- and fifth-day cases are precisely those in which clumsy operative technique and faulty judgement will show their largest debit. In a large personal series of third-, fourth- and fifth-day cases treated by immediate operation, Nuttall has recently shown that with care and judgement the mortality can be kept as low as 2.6%, 3% and 7.4%. Judgement in such cases is largely a matter of the site of the incision and of how much is to be attempted in each case.


Acute appendicitis calls for urgent operation in all cases and at all phases until a localized abscess unassociated with a spreading peritonitis is evident. If any departure is made from that principle, surgical conditions must be ideal for carrying out the so-called delayed treatment. If treatment is to be delayed, what is to guide us? Some would urge a time factor. All that can be said is that few pathological, especially acute inflammatory,

changes progress so uniformly that they run on a time schedule. A time factor seems to have displaced loss of cutaneous hyperæsthesia above the inguinal ligament. It would seem that reliance can be placed on neither of these, and while in trained hands either campaign will give good results, in most hands immediate operation is fraught with less risk to the patient.

When all allowance is made for the first two decades of life and for patients over fifty years of age, there is very little to be said in favour of the delayed treatment.

Decision as to the scope of the operation and the expedition with which it is completed are much more important than decisions as to whether operation is necessary; these are outside the scope of my discussion.

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NEURALGIAS OF CRANIAL AND CERVICAL ORIGIN OTHER THAN TIC DOULOUREUX.

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TRUE MIGRAINE.

TRUE MIGRAINE is a relatively common disease, and is characterized by its (a) hereditary tendency and life-long course, (b) periodicity of attacks, (c) associated ocular hallucinations and "bilious" attacks of vomiting, (d) associated disturbances of the sympathetic system, (e) unilateral and, occasionally, bilateral headaches. It is regarded as being due to an initial vasomotor spasm, affecting the branches of the posterior cerebral artery, and the succeeding headache is associated with vaso-dilatation and rise of intracranial tension. Sometimes the periodic pain may become constant, about the fourth or fifth decades. Preventive treatment has always been directed towards suitable personal hygienic measures, elimination of worry and excitement, removal of septic foci, correction of errors of refraction and exclusion of possible allergic substances from the dietary. Ketogenic diets with high calcium and vitamin *D* content have been tried, and fields of endocrinology and biochemistry have been fully exploited. For use during the attack, numerous sedatives drugs, given both by oral and parenteral routes, have enjoyed a period of fashion, until recently ergotamine tartrate ("Gynergen") seems to have achieved a large measure of success.

Operative treatment had been limited to subtemporal decompression and tying of the middle meningeal artery. This could hardly be of much help in true migraine, although effective in a case reported recently in which attacks of pain, localized to the left temporal region, were found to be due to impingement of a spicule of bone on the anterior branch of the middle meningeal artery. Division of the sympathetic plexus on the middle meningeal artery should be of more avail. In selected cases, cervico-thoracic ganglionectomy, by causing visceral efferent interruption, has proved a most efficient treatment. Suitable cases can be determined by injection of these ganglia with "Novocain" during an attack; if immediate relief follows the production of a Horner's syndrome, then permanent relief should follow ganglionectomy. Migrainous headaches which respond to ergotamine tartrate should also respond to autonomic denervation. The following case histories demonstrate many of these features of migraine.

A male patient, aged nineteen years, had been subject to attacks of headache and vomiting for ten years. His father and also one elder brother had bilateral headaches relieved by vomiting; one uncle was subject to hay fever. His headache began on one side, with pain around the eye; the pain spread to the cheek and temple, and then to the opposite side. He usually awoke with an attack. He would vomit after some hours, with partial relief. Occasionally, after much driving in an open motor car or exposure to wind, he would experience a transient diplopia; and, two years ago, after a hard day's work and an evening at the cinema, he suddenly became blind in the right eye

for about twenty minutes. When the vision returned, it did so from the centre, like a diaphragm-shutter opening out. He had never been able to stand vibrations nor being jolted over rough ground without vomiting.

Attacks used to occur every two or three months; recently they had increased in frequency and were almost of daily occurrence when the patient was first seen.

The results of physical examination and investigations, including encephalography, were negative. The pain produced by the subarachnoid injection of air was similar to that which occurred during an attack. Later, during an attack, he was given 0.25 milligramme of "Gynergen" with some relief. He was allowed to go home, and was given cod liver oil in milk thrice daily. He reported recently for "follow up", and stated that he had been free of attacks ever since (a period of nearly three years).

A female, aged forty years, was unmarried and the manageress of a restaurant. She had been very clever at school, and had taken a degree in domestic science at a university. One brother had been subject to headaches of sudden onset and cessation, during which he occasionally had transient blindness.

Since the age of five she had been subject to severe spasmodic headaches, usually bilateral, and occurring in attacks lasting two to three days. The pains started across the forehead and spread to the left eye (which watered and twitched), teeth, ears and the back of the head. No visual disturbances had been experienced. Vomiting occurred when the pain was severe.

About four years ago the attacks were very frequent, and seemed worse at the time of menstruation, so all the pelvic adnexa and appendix were removed. Double tonsillectomy also failed to give relief. Sedatives and endocrine-substitution therapy were tried; but only morphine seemed to alleviate her pains at all.

About two years later she went to Adelaide, where a diagnosis of atypical migraine was made, despite a psychogenic basis to the attacks. Mr. Leonard Lindon performed a subtemporal decompression, also cutting and tying the middle meningeal artery low down on the left side. The headaches disappeared almost at once after the operation, and she was soon back at work managing a café.

MIGRAINOUS (CILIARY) NEURALGIA.

Migrainous (ciliary) neuralgia is a definite entity, and is characterized by pain referred to the temple, eye, cheek and jaws; it is usually unilateral, but occasionally spreads to the opposite side. Nausea may occur, but rarely vomiting. The duration of paroxysms may be as short as ten minutes, or as long as twenty-four to thirty-six hours. Paroxysms recur frequently for six to eight weeks; then follows a long free interval. In some cases a dull sort of ache persists between attacks. Teichopsia, visual hallucinations, hemianopia and monoplegias never occur; but when the pain is chiefly centred around the eyeball, there may be much congestion and lachrymation.

Migrainous neuralgia is regarded as a vasomotor spasm, affecting blood vessels of the dura, such as the middle meningeal artery, and the pain is referred along the recurrent trigeminal branches from the meninges. Thus alcohol injections of the supraorbital and/or infraorbital nerves give temporary relief. A more lasting relief is obtained by destruction of the inner two-thirds of the Gasserian ganglion with alcohol. The headache of migrainous neuralgia has been compared with that produced by injection of 0.1 milligramme of histamine, which can be arrested by trigeminal block, but which is uninfluenced by stellate ganglionectomy, in contradistinction to certain other hemicranias, to be described later.

There are numerous painful conditions around the eye which may simulate ciliary neuralgia, owing to the presence of congestion and lachrymation; such conditions are chronic glaucoma, *herpes frontalis*, true trigeminal tic, and that rare malady *migraine ophthalmoplégique* of Charcot.

The following cases illustrate some of these points.

A female patient, aged forty-two years, about five years ago noticed sharp pains which appeared suddenly in the left temple, shooting into the left ear. At first they

would only last a few seconds, and she would get only two or three spasms at intervals of about three weeks. They usually came on in the early morning and woke her up. Glasses were ordered without relief. A year later the pains spread to involve the left upper jaw, and all her teeth were extracted with temporary relief. Two years later the pains radiated to the left lower jaw and down the side of the neck, below the ear. Finally, a year ago, the pains became much worse and the attacks of longer duration and more continuous, affecting the left side of the face, nose and neck. Eating and drinking would cause exacerbations. After a severe bout, her eyes would be "bad" and she could not thread a needle. All possible organic causes having been excluded, the left Gasserian ganglion was injected on trial with "Novocain" during a bad attack. Immediate relief of all pain followed the production of numbness, which lasted for about two hours. This relief persisted for nearly twenty-four hours. Accordingly, a week later, after the pains had returned, alcohol injection of the ganglion was performed with, so far (two and a half years later), lasting numbness and relief of pains.

A female patient, aged twenty-one years, a chain store supervisor, developed left-sided headache five years ago. The attacks would recur at weekly or fortnightly intervals and last about twenty-four hours. The pain would be felt when the patient awoke in the morning in the left frontal region and extend into the left eye, which would have poor vision and become swollen and red; the pain would then radiate to the left cheek, nostril and ear. The glands in the left side of the neck would appear to swell and the muscles to tighten up. The skin of the affected areas would feel itchy and irritable in an attack; and at times vomiting would occur.

When the patient was seen on the day after an attack the left upper eyelid drooped slightly and chemosis was present. All investigations yielded no evidence of abnormality; so when the next attack of pain occurred, a trial injection in the left Gasserian ganglion with "Novocain" produced relief at once. Accordingly, absolute alcohol was injected, and so far (two years later) no further attacks have been reported.

CHRONIC NEUROSIS OF THE JAWS.

Chronic neurosis of the jaws (one of the so-called "atypical neuralgias of the face") is another definite entity and distinct from Sluder's neuralgia of the sphenopalatine ganglion. It is limited to women of reproductive age, and is continuous day and night. The cheek and maxillary region are chiefly affected, although the whole trigeminal area of one side and then the other may be involved. The patient may complain of flushing and swelling. The sudden eloquent postures and anguished expressions of the true *tic douloureux* patients are never seen. Indeed, the patient's demeanour may not give any inkling to the clinician that pain is present, despite protests that "it is unbearable and never ceases". These cases are the happy hunting ground of the dentist, the rhinologist and the oculist. Antral lavage, antrostomy, turbinectomy, sinus curettage and wholesale dental extractions and fitting of glasses have all been carried out before alcohol injections are suggested. All these destructive operations are not only doomed to failure, but do further harm by tending to fix the pain and diminish chances of suggestive treatment. These cases are to be regarded as having a psychical origin, which is often traceable to some nervous shock. Even the flushing and swelling are not necessarily evidence of local disease, and may be due to reflex vasomotor disturbance secondary to psychalgia or pain of central origin. The following case has been selected from many to show these points.

A female patient, aged twenty-eight years, was an attractive, intelligent and highly emotional school teacher. Her father died when she was very young; her mother married again soon after, and she had been brought up by grandparents. Her early schooling had been received at the hands of a governess and then a tutor; but, becoming unmanageable, she was sent to a convent at the age of thirteen. She had graduated Master of Arts at the age of twenty-one, and was then appointed sports mistress at a leading girls' school. About this time, after one year's engagement, she suddenly broke it off on her wedding eve, and subsequently became engaged to another

man. This had dragged on for six years, and seemed to be quite unlikely to mature into marriage.

About eighteen months ago she developed a violent throbbing in her right ear. This was followed by severe neuralgia in the right side of her face, neck and shoulder. About this time she began to experience peculiar sensations of extreme fatigue, as though she were going "dead" inside, and seemed unable to breathe or swallow. On occasions the roof of her mouth would become numb. Tickling sensations appeared in her Eustachian tubes and small swellings on her uvula. Following antral lavage, shrill screaming noises developed in her right ear. A severe "cold" produced bilateral tinnitus and dragging pains in the right side of her face. Headaches followed and terrible sensations of pressure in her head. Extraction of impacted wisdom teeth led to a pulling sensation at the back of her neck. Cold and wind increased her discomfort. She had to give up her teaching when the pains spread to her throat, and she became nearly "demented". An intercurrent attack of influenza saved her from having her sphenoid and ethmoid sinuses curetted. Vomiting, abdominal pain and numbness in her right leg led to appendicectomy. The caecum had failed to rotate completely, and the appendix was found up near the liver. Only the strongest persuasion was able to prevent her having numerous teeth extracted for "pyorrhœa" which did not exist. After much cross-examination, the unsatisfactory matrimonial situation was revealed. Advice to break this off coincided with "falling for" a tea-planter from the East and a change from school surroundings, after which improvement was slowly but definitely maintained.

POST-HERPETIC TRIGEMINAL NEURALGIA.

Post-herpetic trigeminal neuralgia can occur and prove most distressing. It usually follows an infection of the ophthalmic division of the ganglion, and is called *herpes zoster ophthalmicus*. The other divisions may be involved at the same time or separately. In the young it usually passes off without any legacies, but in the aged it is nearly always followed by a continuous insistent pain, despite numbness to ordinary stimuli, a condition called *anæsthesia dolorosa*. It is most intractable to surgery. Oral administration of arsenic and potassium iodide to saturation, inhalation of trichlorethylene and deep X ray therapy have all been tried, with only occasional and temporary relief. Alcoholic injections are definitely contraindicated, and even resection of the afferent sensory root is not always successful, as the pain has been established centrally as a psychalgic pattern.

NEURALGIA DUE TO TUMOURS OF THE GASSERIAN GANGLION.

Pain in the trigeminal field may be due to a primary tumour of the Gasserian ganglion, but is readily distinguishable from other neuralgias by its constancy, its increasing severity and by the presence of anæsthesia and analgesia of the affected area, in the absence of previous herpes or injections. The motor root is affected also, with unilateral paralysis and wasting of masseter and temporal muscles. Cases of this nature are extremely rare, but one was fully described recently by Professor Harold Dew and Mr. Richard Flynn, and the pathology and clinical features were fully considered by them. A patient with primary neurinoma of the fifth nerve has recently been operated on by the author, and this case will be reported in detail elsewhere.

NEURALGIAS DUE TO OTHER INTRACRANIAL AND EXTRACRANIAL TUMOURS.

Owing to the widespread situation and distribution of the fifth cranial nerves in the posterior and middle fossæ, in the walls of the cavernous sinuses, and in canals in the base of the skull, it is not surprising that they are frequently affected in some part or other of their course by a variety of lesions, and that trigeminal pain is often one of the earliest symptoms of their presence. As with primary tumours, classical *tic douloureux* can be

eliminated by the discovery of anaesthesia in one or more of the divisions, and often by the presence of neurotrophic keratitis. First place among these lesions must be accorded to tumours of the *nervus acusticus* and cerebello-pontine angle; and a male patient, aged thirty-nine years, who had a large acoustic neurinoma, complained of right-sided facial pains, paræsthesia and peculiar unpleasant sensations whilst shaving for nearly six months before the discovery of deafness. In another patient, a female, aged forty-seven years, pains and extreme hyperæsthesia of the scalp were complained of over the first division of the trigeminal nerve of the same side for months. Other tumours which have been found to be especially responsible for referred trigeminal pain have been three large meningiomata, all in females in their fourth decade. One was situated on the *tentorium cerebelli* at its junction with the *falx cerebri*, another at the attachment of the tentorium to the postero-lateral portion of the petrous ridge on the lateral sinus, and the third arose from the inner portion of the sphenoid ridge and invaded the middle fossa. Numerous other lesions, such as aneurysms of the circle of Willis and internal carotid arteries, localized basal tuberculous or syphilitic meningitis, tumours of the pituitary gland, the naso-pharynx and nasal sinuses, antrum and metastatic tumours and even Paget's disease of the skull, have all been encountered.

NEURALGIA DUE TO MEDULLARY SCLEROSIS AND OTHER CENTRAL LESIONS AFFECTING THE FIFTH NERVE CONNEXIONS.

The occurrence of neuralgia due to medullary sclerosis and other central lesions affecting the fifth nerve connexions is rare, but must always be borne in mind. Thrombosis of the posterior inferior cerebellar artery is associated with a definite syndrome and with a sclerosis which chiefly affects the long descending spinal root of the fifth nerve, with the production of pain. Although not definitely proven, the following case may well fit into this category.

A male, aged fifty-seven years, noticed pain in the left side of his face about two years ago, which soon spread to the left eye and forehead. At first it was spasmodic and occurred about once a week, but then it became a daily event. For the previous six weeks he had noticed a constant diplopia, found to be due to left lateral rectus palsy, and some auditory hallucinations. There was a diminution in all sensations in the areas of the pain, and some variable paresis of the left side of his tongue was present. The left trigeminal ganglion was injected, with complete numbness of cornea and all areas, but no relief of pain. Intracranial tumour of the base being suspected, full lumbar encephalography was carried out. The X ray films revealed an advanced and irregular degree of atrophy of the brain, especially in the posterior fossa and on the left side, but no evidence of tumour, either extracranial or intracranial. Some weeks later he developed hallucinations of smell and delusions of persecution. In the absence of syphilis and tumour, these symptoms could be due to softening after thrombosis, associated with a general cerebral arteriosclerosis and/or atheroma.

Other central lesions which have been found to cause trigeminal pain are multiple sclerosis, encephalitis and infiltrating tumours of the pons, mid-brain and posterior part of the third ventricle involving the quinto-thalamic and thalamo-cortical tracts, or even the thalamus itself. In these cases the pain is peculiarly unpleasant and widespread, often associated with hemi-hyperalgesia. Such pain occurred as an early symptom in the following case.

A male medical practitioner, aged forty-nine years, noticed that for the previous six months everything that he did required an extra effort, and that he was losing interest in his work. He would get very sleepy, and would have to sleep in between

seeing patients. About the same time he experienced very nasty peculiar feelings in the left side of his face and in the left hand and foot. Shaving was particularly disagreeable on that side, and he would always make his family kiss him on the right cheek. These areas were very hyperæsthetic and hyperalgesic in a gross way, and the sensations could not be localized. Later, paresis appeared in the left limbs, and he would bump into objects on the left side when walking. Altitudinal diplopia developed, and he could not read, as the left half of the line would deviate upwards.

At *post mortem* examination a large infiltrating and necrotic tumour was found involving the posterior end of the third ventricle on the right side, the thalamus, the upper part of the mid-brain and hypothalamus and both superior quadrigeminal bodies. It blocked the aqueduct of Sylvius, causing an internal hydrocephalus. Microscopic sections showed it to be a *spongioblastoma unipolare* and *bipolare*.

NEURALGIA OF DENTAL ORIGIN.

Neuralgia of dental origin is common, and must always be borne in mind. It is frequently associated with unerupted and impacted wisdom teeth, and may be referred along any of the branches of the fifth nerve and even to the opposite side. It is usually more or less constant in character, with exacerbations. In other cases the neuralgia may be due to odontomata or cysts arising out of remains of the original dental germ, stimulated by pre-existent sepsis or not. Correction of the offending dental disorder always relieves the neuralgia quickly.

NEURALGIA OF OCULAR AND ORBITAL ORIGIN.

Neuralgia of ocular and orbital origin may be due to errors of refraction, glaucoma, intraorbital tumours and, as already mentioned, ophthalmoplegic migraine. Refraction errors have usually been eliminated early. Glaucoma causes a rapid loss of vision when it is acute, but in chronic glaucoma severe pains may occur in the temple, cheek and forehead without diminution of visual acuity, but cupping of the disk and a high intraocular tension should clinch the diagnosis.

Ophthalmoplegic migraine is rare. The pain usually lasts for days or weeks at a time, and the presence of a third and/or sixth nerve palsy should settle its diagnosis. Leaking aneurysm on the circle of Willis, or one of its branches, is now regarded as being the cause of this condition. The gradual progression of the palsy with each subsequent attack and its failure to clear up certainly suggest an organic basis, such as aneurysm.

Another cause for neuralgia having its origin in the orbit is the compression of the supraorbital nerve by bony overgrowth at the supraorbital notch converting it into a canal. An extremely interesting case of this character was recently described by Norman Dott and Harrowes, in which the patient was regarded as suffering from an advanced psychosis for years prior to the discovery of the organic basis.

SYMPATHETIC HEMICRANIA.

Much controversy has taken place on the subject of sympathetic hemicrania (including tumours of, or affecting, sympathetic ganglia). In 1933 Harris stated:

A theory that has often been put forward, that sensory painful impressions may be carried centrally along sympathetic fibres, usually in an attempt to explain the persistent pain continuing after section of the sensory trigeminal root, is probably founded on fallacy. Such cases are most probably to be explained by the persistence of a few uncut fibre bundles, or else that the pain is of central origin, either organic

or functional. The balance of modern physiological evidence is against the conduction of sensory painful stimuli along sympathetic nerve trunks.

Yet in 1936 he stated:

There are other forms of paroxysmal hemicrania in which the source of the pain is probably of sympathetic origin.

These cases differ from migrainous neuralgia in which the pain resembles closely the headache produced by injection of histamine, relieved by blocking of the Gasserian ganglion, but not influenced by stellate ganglionectomy. Numerous observers have produced pain in the face by stimulation of the superior cervical sympathetic ganglion, but not from the trunk or the stellate ganglion. The whole position has been reviewed recently by Loyal Davis, and he concludes that there are no afferent sensory pathways in the cervical sympathetic trunk, but that the pain following stimulation of the superior cervical sympathetic ganglion was produced by stimulation of its efferent fibres, which affected the peripheral blood vessels, a histamine-like metabolite being liberated which stimulated trigeminal nerve endings. Harris does not accept these views, as they are contraindicated by clinical experience in Tinel's case, in which pain of a continuous burning causalgic nature, with paroxysmal crises, persisted when both the trigeminal and facial nerves had been destroyed, although the latter is alleged to transmit deep-pressure pain sensibility. Tinel maintains that the sympathetic afferent path is latent, and only capable of being awakened in certain pathological states to transmit violent pain. Harris thinks that this accounts for the preservation of deep sensibility in the face after fifth nerve resection. Spontaneous pains returning or persisting after complete sensory root section are called by him "Gasserian ghosts", and are thus regarded as "sympathetic neuralgia". Furthermore, primary recurrent hemicranial neuralgia which has been relieved by sympathetic stellate ganglionectomy has been described by Harris and by Craig of the Mayo Clinic.

The pain usually recurs at more or less regular intervals, with or without nausea. It is a deeply seated, burning, throbbing pain in the temporal, zygomatic and nasal regions, behind the eye, in the cheek and gums, and behind the ear and occiput. It may be associated with sympathetic phenomena, such as profuse sweating of forehead and temple, lachrymation and congestion of the eye, and clogging of the nose, followed by epistaxis. Before ganglionectomy is advised or performed, a trial test for relief of the pain should be carried out in an attack by injection of the stellate ganglion with "Novocain".

The following case serves to illustrate this condition.

A female, aged thirty-five years, and a divorcee, "enjoyed" bad health, and during her comparatively short life had been operated upon for *fistula in ano* (twice), appendicitis, salpingitis, uterine fibroids and cervicitis, and finally, four years ago, cholecystectomy; so that the soil was fertile!

About one year later she developed severe and persistent headaches. They would commence at the back of her neck and come up over her head, mainly on the right side, to the face and jaws. Occasionally the pain was felt below the ear. At first they were intermittent, but later the pain was continuous. About the same time she put on two stone in weight, developed hirsuties on the face and limbs with discoloured striae. Her systolic blood pressure was consistently around 160 millimetres of mercury and her diastolic pressure around 100 millimetres. Skiagrams of her skull revealed slight enlargement of her pituitary fossa, and the fields of vision were thought to show an early upper bitemporal defect. The strong possibility of a basophilic tumour of her pituitary gland was considered, especially as at times she was highly emotional. She also had some *diabetes insipidus* whilst under observation. Lumbar puncture and

dehydration by intravenous injection of 50% glucose solution would give temporary relief of the headache. Restriction of fluids relieved the polyuria, and a low caloric diet with thyroid and pituitary gland tablets decreased her weight and blood pressure.

Fifteen months later her headaches were still constant and severe, despite double tonsillectomy and enucleation of the remains of her *cervix uteri*. Now, however, they were limited to the right side of her head and face, especially in the parietal and occipital regions. Further intracranial investigations were carried out, and no abnormality was found. Accordingly, about twelve months ago right stellate ganglionectomy was performed. After this operation she developed "terrible" pains in her right shoulder and right upper extremity due to brachial plexus irritation, but relief from headache became complete, and when seen later she was very well and back at work as a domestic servant.

Neuralgia from Tumours Involving or Affecting the Stellate Ganglion.

In addition to hemicranial neuralgia, pain in the neck can occur from tumours of, or affecting, the stellate ganglion. Primary ganglioneuromata or sympatheticotomata are very rare, although cases have been described in the literature. In the following case, that of a tumour involving the stellate ganglion, the clinical diagnosis was fairly obvious.

A male, aged forty-one years, first noticed pains in the right posterior triangle of his neck about nine months before seeking advice. Shortly afterwards he noticed a swelling there; he also noticed that his right pupil was smaller than his left and that the right upper eyelid drooped. The pain was dull and aching and kept him awake at nights. Later it spread to his right shoulder and right arm. He then developed a tickling sensation in his throat, with a dry ineffectual cough. This was followed by some dysphagia and a husky voice.

When he was examined an indefinite tumour could be felt in the lower part of the right posterior triangle; a well developed Horner's syndrome was present in the right eye; and X ray films of the right lung, after induction of artificial pneumothorax, showed "a small shadow at the right apex displacing the trachea to the left, possibly neoplasm". Deep X ray therapy was given with considerable relief of dysphagia and huskiness and cough, but the pain persisted. About six months later he developed a small swelling deep to the middle third of the right sterno-mastoid muscle. The Horner's syndrome was still well marked, and an injection of pilocarpine failed to produce any sweating on the right side of the face and neck.

At operation in the right posterior triangle an infiltrating mass was felt between the large vessels and the trachea after division of the *scalenus anterior* muscle. It seemed to extend into the thorax. Some glands lying in the angle between the subclavian and internal jugular veins were removed for biopsy.

Considerable doubt and discussion took place regarding the pathology of this tumour. Some regarded it as an endothelioma of the pleura, but others thought it might have arisen from the sheath of the stellate ganglion.

Further deep X ray therapy was given, but the patient died six months later. Unfortunately, no autopsy was obtained.

Neuralgia from Combined Affection of the Sympathetic and Fifth Nerve Innervation.

Finally, evidence is sometimes seen of a combined affection of the sympathetic and fifth nerve innervation, such as occurred in the following case of neuralgia, associated with vasomotor disturbances like angioneurotic oedema.

A female, aged seventy-seven years, complained of peculiar bilateral sensations of tingling pain in her lower lip, chin and tongue at its tip. It had been constant for three to four years, and was associated with swellings like chilblains, from which serum exuded at times. She had previously been a sufferer from bilateral migraine until recently relieved by "Proklimon" injections. All forms of medical, dietetic and allergic treatment had failed, including injections of local anaesthetic. Attempts were made to anaesthetize both mandibular divisions of her fifth nerves. Only transient numbness was obtained, however, and the swellings were not improved.

GLOSSO-PHARYNGEAL AND GENICULATE GANGLION NEURALGIAS.

Glossopharyngeal and geniculate ganglion neuralgias are types of primary neuralgia only recognized recently and comparable in every way to fifth nerve tic. Although they are rare, their recognition is very important. In glossopharyngeal neuralgia the pain is limited to the distribution of part or whole of the ninth nerve; it usually starts in the base of the tongue or the tonsillar region, and radiates deeply to the ear and side of the neck. Eating, chewing and drinking, or even talking, often start an attack. Trigger zones are on the base of the tongue or tonsillar fossæ, cocaineization of which stops an attack temporarily. Permanent relief can be obtained only by intracranial section of the ninth nerve in the posterior fossa. Alcohol injections are very difficult and so are extracranial resections; nor are they satisfactory. The resulting unilateral numbness of the posterior third of the tongue, palate, pharynx and tonsillar region, with some loss of taste, is not noticeable to the patient.

Tympanic plexus or so-called geniculate ganglion neuralgia is an even rarer condition, and was at one time thought to be associated with the seventh nerve and its ganglion, whose afferent root is the *pars intermedia*. It is characterized by sharp stabbing pains deep in the external meatus of the ear, and often herpetic vesicles appear there. Some deep and burning sensations are often present too in the musculature of the face. It is really due to an involvement of Jacobsen's nerve (the tympanic branch of the ninth nerve) to the geniculate ganglion, and is curable only by ninth nerve resection. So far none of these types of neuralgia has been met with here.

OCCIPITAL AND CERVICAL NEURALGIA.

Occipital neuralgia occurs in the distribution of the great occipital nerve. It may begin as a true neuritis, due to an injury, acute fevers and "rheumatic" infections of the muscles and fasciæ of the neck, septic absorption from teeth, tonsils *et cetera*, and then persist owing to the formation of fine adhesions and fibrous tissue. The pain is dull and aching, and extends behind the ear and over the occiput to the vertex; and tenderness is elicited along the course of the nerve.

When other nerves of the cervical plexus are involved, the pain may radiate from the suboccipital area to the shoulder and down the vertebral border of the scapula. Old unsuspected fractures and osteoarthritis of the cervical vertebræ may press on and irritate these nerves. *Arachnoiditis serosa circumscripta* may also be a source. Frequently the anterior rami are affected, and spasms of the muscles of the neck lead to various degrees of torticollis, often extreme. The treatment is usually that of the cause, with the use of physical and medical agents at first. In chronic cases, when areas of tenderness can be demonstrated, injections of local anæsthetics, especially of the more lasting variety, such as quinine and urea hydrochloride (1%) or "Proctocaine" or alcohol, may be very helpful. In traumatic and certain selected cases exposure and neurolysis of the occipital nerves are of benefit. Finally, in extreme and intractable cases with long-standing torticollis, nothing short of a complete division of all the posterior roots of the cervical nerves intrathecally will be of any avail.

The following case is illustrative.

A male, aged forty-four years, was a heavy smoker and an alcohol addict. After a bad fall from a motor car, he developed pains in the right side of his neck and

shoulder. These were unrelieved by the usual drugs, and accentuated by his drinking. Three years later he fell off a horse, and the pains changed over to the left side and his neck and head became twisted. Despite injections and physical therapy, the pains became more constant and the torticollis increased. Insomnia developed and led to paraldehyde addiction as well.

When seen, he had a fixed torticollis to the left, his chin almost touching his left shoulder. Under anaesthesia the condition could not be fully corrected until several fibrous bands in the affected muscles had been cut, and then a plaster packet was applied in the corrected posture. This was worn for a month with temporary relief, but the condition soon relapsed, despite removal of septic teeth and tonsils and administration of vaccines.

Plain skiagrams of his cervical spine showed old doubtful fractures of the bodies of the fifth and sixth cervical vertebrae. Lipiodol was then injected by *cisterna magna* puncture, and further X ray films showed that it was held up irregularly in "lumps" all along the cervical canal, indicating subarachnoid adhesions. Accordingly, cervical laminectomy was performed, and an extensive condition of *arachnoiditis serosa* was found, probably the result of previous trauma and haemorrhage. All the posterior roots from the second to the sixth cervical segments inclusive were cut on each side. Intense hyperaesthesia of the segments below the sixth cervical was present for some days, but gradually subsided. Great relief of pain followed, although the resultant areas of numbness were surprisingly small, and the muscular spasm was not completely relieved. Probably some of the anterior roots should have been cut too.

Two years later he had returned to his old habits of drinking and drugs. His torticollis had also recurred. He had another fall from a motor car, injured his head, recovered and then died comparatively suddenly eight weeks later, probably of *Spät-apoplexie*. Unfortunately, there was no autopsy.

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NEURALGIA DUE TO SINUS INFECTION.

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SINUS infections are so common that, although the majority do not produce pain, and although the pain when present is usually not neuralgic, neuralgia of such origin is fairly frequently encountered.

SYMPTOMATOLOGY AND DIAGNOSIS.

Pain from disease of the sinuses may be due to many causes, and it will be advisable to consider the characteristics of some of them first.

Toxæmia produces pains in any part of the body in such conditions as fibrositis, arthritis *et cetera*; and sometimes when nerve sheaths are selected, the pain is most severe.

Distension of a sinus with pus, gas or swollen mucous membrane is due to infection associated with a blocked ostium and produces pain. Similar symptoms of a milder degree occur from the weight of pus in a sinus. These distension or weight pains are common in sinusitis. They are seldom very intense, but tend to be worse in the daytime than at night, and are worse with colds. When acute infection occurs with complete or nearly complete blockage, the pain often becomes intense. It is by then not due entirely to distension, as the pain of osteitis, periostitis or of inflammation of nerves is superadded. In pure distension the pain is not necessarily felt at the site of the sinus; for example, antral pain of this type is felt in the forehead, and its distribution does not coincide with that of any particular nerve distribution. Very slow distension, such as occurs by the formation of a mucocoele, if free from infection, does not cause pain.

"Vacuum" produces a pain similar to that of distension, but it is rarely severe enough to cause a suspicion of neuralgia. It is most commonly met with in thin walled sinuses. A sinus suffering from "vacuum" is often not infected, and naturally, if it were, the infection would have to be of low grade or distension would result instead. Vacuum, of course, is produced by blocking of the ostium, the trapped air being slowly absorbed by the blood circulating in the sinus mucosa.

Osteitis occurs in two forms. Acute osteitis gives rise to a severe boring pain which keeps on day and night and which is therefore noticed by the patient chiefly at night. It is the most constant of sinus pains, and can best be appreciated by those who have suffered from the dental condition of dry socket. Nerves in the vicinity frequently become inflamed, and the whole condition is often thought to be neuralgia.

Chronic osteitis occurs chiefly in those cases in which the sinus has been first infected in childhood, when the sinus was small and in which its growth was retarded. It also occurs in cases of atrophic rhinitis, but may be present in any long continued sinusitis. Pain is usually not present, but when it is,

it may be very chronic, but is seldom severe. It rarely has the stabbing quality of a neuralgia, although it is said to be due to pressure on nerve endings in the bone.

Periostitis gives rise to tenderness of various degrees over the sinus. The tenderness is not felt at a distance and pain is not neuralgic.

Nerves become involved by infection or pressure. The pain is typically neuralgic and is felt in the area of distribution of the particular nerve involved, but may also be referred to other branches of the fifth cranial nerve, or more rarely to other cranial nerves.

Infection of sinus origin may spread to great distances and give rise to pain elsewhere. Watson Williams long ago demonstrated organisms from a sphenoidal sinus in the pituitary gland. More recently Pickworth has made a monumental contribution to medicine by showing that organisms from infected upper air sinuses can be found in sections of the pituitary gland, meninges, walls of cerebral vessels and even in the brain. This confirms many clinical observations, and explains how it is that in some cases of sinusitis patients have the pains typical of a chronic meningitis.

In the various sinuses the above-mentioned types of pain are met with in different ways.

In antritis with chronic infection there is usually no pain between acute exacerbations, and when present it is usually a dull pain in the forehead of the same side. With the antral contents under high pressure the pain is more severe, and pressure or infection of nerves produces neuralgic dental pain, even if the patient is edentulous. With periosteal involvement there are tenderness and pain in the cheek.

In the case of the frontal sinus, pain is almost always present with infection, but with the polypoid type of involvement pain is rare. Pain is present in the forehead, and may be so intense that I have seen patients with it lie almost unconscious to external stimuli. (In this condition the patient rallies at once as soon as the pain subsides, and it should not be confused with that state in which the patient goes into a long continued apathetic condition. This latter is due to congestion of the frontal lobe of the brain or to frontal encephalitis or abscess.) Tenderness is present over Ewing's point near the trochlea of the superior oblique muscle and less commonly over the anterior sinus wall. As the sinus begins to discharge into the nose the pain becomes less constant, until it assumes the type which is so typical that a correct diagnosis can be made from the type of pain alone. This pain is not present when the patient wakes, but comes soon afterwards and lasts until midday or up to the late afternoon, when it subsides.

This daily periodicity is said to be due to the sinuses filling during the night with pus and emptying during the day; but such an explanation is not the whole truth, for, if it were, the headache should be at its worst when the patient woke. The pain is made worse by reading, probably owing to traction on the tender floor of the sinus by the trochlea. In acute obstruction the pain is often thought to be neuralgic. When the pain is especially severe a spasm may occur which slightly closes the palpebral fissure on the same side for hours at a time. This sign usually indicates acute frontal or anterior ethmoidal sinusitis, but although this spasm is usually present only whilst the pain is extreme, I have seen three cases in which the spasm was

still present at times during which the pain was slight or even absent. Neuralgia of the nasal nerve is not uncommon, but is peculiar in that pain is not so severe as nor so paroxysmal as neuralgia in general. This pain is felt on the bridge and also on the upper parts of the nose, and the patient often cannot tolerate spectacles. The pain is not constant, but comes at periods with recurrent nasal infection. Anæsthesia of this nerve from ethmoiditis is very rare.

Sphenoidal sinusitis is perhaps the most interesting from the aspect of pain. In fact, pain almost anywhere in the head can be caused by it. Pain due to distension of the sinus is a deep boring pain deep between the eyes or in the occipital region. A common finding in sphenoidal disease is a very tender spot three to four centimetres posterior to the mastoid of the same side. Neuralgias of sphenoidal origin can be very severe, and may involve any portion of the fifth cranial nerve. Sluder has shown that large sphenoidal sinuses may come in actual contact with the Vidian nerve, with the first and second division of the fifth cranial nerve, and when the cavernous sinus is also small, actually with the Gasserian ganglion. Minor neuralgias or typical *tic douloureux* can thus be caused by sphenoiditis.

Whilst I am discussing the subject of pain in sinus disease, it may not be out of place for me to refer to the sphenopalatine ganglion syndrome as described by Sluder. This he attributes to irritation of the sphenopalatine ganglion by adjacent nasal or sinus infection. He describes the sensory symptoms as lower half headache, that is, the pains are below the eyes, the area involved being the root of the nose, the upper jaw and teeth, the mastoid area (especially a point five centimetres posterior to the mastoid), and the occiput. Sometimes the pain extends into the neck, scapulae, arms or fingertips, and there may be a stiff aching throat, with a change of taste in the anterior two-thirds of the tongue. The sympathetic symptoms described by him are even more variable, and he has treated the ganglion for sneezing, rhinorrhœa, congested conjunctivæ, photophobia, asthma, red nose, writer's cramp, migraine, hiccup and even diarrhœa.

The diagnosis is made by cocaineization of the ganglion, when relief is experienced; and treatment consists of alcohol injection of the ganglion or in treatment of the local infective lesion, for example, operation on the sphenoid. Sluder believes that the mastoid, occipital and cervical pains spreading down in some cases to the arms and fingers, are due to irritation of the part of the ganglion supplied by the Vidian nerve.

In most cases, in my opinion, the pains described by Sluder can be put down to simpler causes; for example, the pain in the root of the nose to ethmoidal involvement, the pain in the cheeks to antritis, the occipital mastoid and cervical pains to fibrositis; and when any of the symptoms in question have presented themselves I have always been able to find evidence to support a diagnosis simpler than that of Sluder's syndrome.

The detailed diagnosis of the cause of the pain is too large a subject for a paper of this scope. A thorough general, neurological, oto-rhino-laryngological, radiological, ophthalmological and dental examination may be necessary and generally makes the diagnosis clear. In cases of "vacuum" pain the use of an ephedrine spray may clear up the pain each time it is used. This clinches the diagnosis, especially if the patient hears a rushing noise as air enters the sinus.

TREATMENT.

The treatment of neuralgias of sinus origin is first that of the sinus infection. Acute sinusitis is treated with nasal ephedrine packs or sprays, rest in bed, inhalation and radiant heat. Severe cases are treated by puncture and lavage or by dental attention as required. In involvement of the frontal sinus, unless signs of bone infection are already present, every attempt to cause subsidence of the condition must be made before the sinus is dealt with surgically. Facilitation of drainage by removal of the middle turbinate is as a rule very successful, and it should be the exception for a patient with acute frontal sinusitis to require operation on the sinus itself.

When palliative treatment fails, surgical attack must be made on the sinuses along standard lines.

Until recently the only sinuses that have been amenable to thorough surgical treatment have been the maxillary and frontal sinuses. Attempts to exenterate the ethmoidal cells by either the intranasal or external route have frequently been abortive owing to the amount of bleeding or to the poor access available and so most ethmoidectomies have been very incomplete. A freely bleeding field has in the past rendered this type of operation dangerous and results have been on the whole very poor.

Sphenoidal surgery has been similarly handicapped, and operators freely admit that after a sphenoidal operation the opening closes down gradually again to the size of the normal ostium. It has not been possible to inspect and, if necessary, to strip the mucosa from the sphenoid as from the antrum. The surgery of the ethmo-fronto-sphenoidal area, however, has been put on a thorough surgical footing of late years by the procedure introduced by Ferris Smith, which may be acclaimed as the greatest advance in otolaryngological practice of the last two decades. Although it is well established abroad, and although the author of the operation has now operated in upwards of one thousand cases, the operation has not yet been generally adopted in Australia.

TIC DOULOUREUX.

By DOUGLAS MILLER,
Sydney.

TIC DOULOUREUX was first described by Fothergill in 1773, and today, as then, the diagnosis rests upon a proper estimation of the history of the case and on an appreciation of the appearance and demeanour of the patient, for this is a malady in which there are no physical signs and in which laboratory tests are of no assistance. It behoves the clinician, therefore, to be well aware of the characteristics of the condition in order that he may be able to differentiate it from other forms of neuralgia, from migraine, from organic disease and from neurosis, and thus save the patient unnecessary or possibly harmful treatment, and himself humiliation and annoyance.

SYMPTOMATOLOGY AND DIAGNOSIS.

The peculiar characteristics of the *tic douloureux* are its sudden onset, its radiation and intensity, and its periodicity. Usually the malady is ushered in by an intense attack commencing in the area supplied by one or other division of the fifth nerve. There may be no precursors to this attack, and it may excel all subsequent attacks in its severity. This is typical. A less typical picture is for the malady to develop on top of a chronic neuralgia, possibly of dental or sinus origin. The fully developed pain of tic may be confined to the distribution of one particular division of the nerve, or, starting in the distribution of one division, the pain may radiate to that of two or more. The division most commonly affected is the third and the most common side the right side. The ophthalmic division is the one least affected as the seat of the primary pain, though frequently it is a site for secondary radiation. The pain is always superficial, referred to the nerve endings. Never is it deep and boring. Another point of great importance is that it is always referred to the ultimate distribution of the nerve, that is, in the mandibular division to the mid-line of the jaw, and in the maxillary division to the philtrum. The attacks are most frequently associated with spasms of the face muscles, and often with agonized grotesque attitudes and with lachrymation.

There is very frequently a definite point from which an attack starts, the so-called "trigger zone". Irritation of this zone by touch, cold or even facial or jaw movement will initiate an attack. The patient may be so terrified of stimulating this trigger zone that she will refrain from smiling, talking, eating solids, and washing. One patient of mine was so terrified of exposing his face to the cold that he told a story of a long walk of several miles into a bleak wind, which he negotiated walking backwards rather than feel the wind in his face. Likewise, the patient racked by tic will almost die of inanition rather than eat, and often on the first interview will appear taciturn and stupid, owing to fear of the action of speaking or betraying emotion. Periodicity is characteristic, and long intervals of freedom may alternate with periods of severe pain. Commonly sufferers are over forty years of age, but it may afflict the very young or the very aged. Women

suffer more frequently than men. Years later the disease tends to become more chronic, the intervals between bouts of pain shorter, though the intensity and the severity of the paroxysms may be less than formerly.

It is worth mentioning, in passing, that there is a well recognized association between *tic douloureux* and disseminated sclerosis, the combination being too frequent to constitute merely a coincidence.

These are the points on which the clinician is to be quite clear—the criteria which his patient must satisfy before a diagnosis of *tic douloureux* is ventured.

Before he makes a diagnosis of tic, it is incumbent on the clinician to exclude dental caries, sinus infections, tumours pressing on the nerve, intracranial tumours and hysteria. No effort is to be spared in excluding caries, and nothing short of X ray examination of the teeth is to be regarded as evidence of freedom from caries. Neurosis may be suspected when the patient's general appearance and demeanour do not lend colour to the piteous tale of suffering, and when the account of the pain does not conform to the criteria I have mentioned.

Patients with pain due to organic interference with the nerve, as by involvement in malignant growths of antrum or jaw or by tumours of the ganglion or posterior fossa, or due to vascular lesions of the brain stem, will usually give a typical history and always show neurological evidence of nerve damage as by loss of corneal reflex, motor weakness or interference with sensation. In addition, there will usually be other signs. The difficulty is of course greatly increased when the patient has previously had alcohol injected into one of the nerve divisions before consulting the surgeon. In such cases one cannot tell whether the signs of nervous discontinuity are pathological or due to treatment. If one keeps in mind the possibilities of error, mistakes are less liable to be made.

TREATMENT.

The question of treatment, then, presents itself often as a matter of some urgency. There can be no doubt that the general tendency is to follow the simplest and safest methods first, particularly should there be any doubt as to the diagnosis. Of course, the simplest and safest is the administration of drugs, and invariably the patient will have been well tried with these before being presented for more serious treatment. Ordinary analgesics have but little effect, though morphine will relieve the intense pain. It is a point worth noting that morphine is unlikely to relieve pain of an hysterical nature. Inhalation of trichlorethylene, which has the action of producing anaesthesia of fifth nerve fibres, has had some vogue, but really is not of very much value.

Treatment by Injection.

Injection of nerve trunks with alcohol in order to destroy the nerve filaments is a method of treatment which some surgeons think should always be tried. The nerves may be injected at their periphery or at their exit from the skull; the semilunar ganglion itself may be injected. If the neuralgia affects only a small segment of nerve distribution, it is a simple and safe matter to inject the division concerned at the point of its peripheral approach to the surface, for example, the supraorbital notch, infraorbital or mental foramina. A few minims of alcohol injected in this way may produce a localized anaesthesia and relieve a minor tic-like pain. I have found this

manœuvre particularly useful in "finishing off" treatment when injection at the foramen of exit from the skull did not produce a complete anæsthesia or relief of symptoms.

An elderly and feeble woman had very severe *tic douloureux* affecting the second division. She had had a previous attempt at injection some months before, and this made it exceedingly difficult to get a satisfactory second injection. After prolonged efforts I succeeded in obtaining an almost complete anæsthesia of the second division, but a small area of the naso-labial region maintained normal sensation, and she continued to have sharp pain localized to this region. An injection of a few drops of alcohol into the infraorbital foramen completed her anæsthesia and she was relieved of her pain.

When the tic is associated with the second or third division, the first step I take is to inject this nerve at its exit from the skull. After a little practice these nerves may usually be located. Under light morphine narcosis, and following a careful technique of localization, one searches for the nerve until a sharp shooting pain, often referred to the distribution of the nerve, is complained of. A particular difficulty may arise in attempts to alleviate very rare neuralgia of the first division by injection. In a large proportion of these cases the malady appears to be associated with second division pain, and it is a matter of experience, quoted by Harris, that satisfactory injection of the second division at the *foramen rotundum* will frequently produce relief of symptoms.

A satisfactory injection will nearly always give relief, usually complete. It is, however, never a permanent cure, and the malady may return six months or two or three years later. Subsequent injections are always more difficult and tend to be less satisfactory. After a second injection, unless there is some definite contraindication, operative treatment should be considered.

Ganglion injections may be given, and are advocated by Wilfred Harris. It is a simple enough technique, but the procedure has most dangerous and untoward possibilities unless carried out by one most expert in its use.

It may be argued with justification that as the disease is inveterate and injection treatment is at best ephemeral, operation should be the initial form of treatment. On the other hand, the operation is not devoid of risks and mistakes in the hands of the occasional operator, and if an elderly patient can be carried on comfortably for a few years without the risk and ordeal of operation, it is worth while. Also to be considered is the fact that often when the surgeon first sees the sufferers they are already worn out, exhausted and half-starved, and injection may enable them to improve in health greatly for operation, which should be undertaken as soon as the malady commences to show itself again.

Another great advantage of injection lies in the fact that the patient knows what numbness is like as a temporary state before entering upon it as an irrevocable condition. So often the surgeon who has successfully divided the sensory root will be haunted by the patient for having produced numbness.

Another very important use of injection is as a diagnostic measure. In many cases trouble arises from the difficulty of making a definite diagnosis. In these one may find out much with "Novocain" and alcohol injections. If the nerve can be injected with "Novocain" during a bout of suffering so as to produce peripheral anæsthesia, and if relief from pain is not produced, one should have great hesitation in proceeding further. "Novocain" which will produce anæsthesia for a few hours at a time may in this way prove the greatest help in saving the surgeon from a false step.

HYDATID CYSTS IN BOTH LUNGS.

By H. KENRICK CHRISTIE,
Wanganui, New Zealand.

WITH AN ADDENDUM BY SIR LOUIS BARNETT,
Hampden, New Zealand.

THE Australasian Hydatid Registry, originated by Sir Louis Barnett, has now collected records of over 1,350 cases of hydatid disease in Australia and New Zealand.

In the report issued in January, 1937, there are 250 cases classified as lung cysts; and others in which lung cysts are present, but are included under cysts of liver, abdomen *et cetera*. Amongst these pulmonary hydatids are 15 cases in which the lung cysts were bilateral. These, with a further case shortly to be added to the registry, form the subject of this review.

The mortality rate in the 16 bilateral cases is 25%, but if two early cases, treated before the days of X rays, are excluded, the mortality rate is reduced to 12.5%. It would be fallacious to claim accuracy in these percentages taken from the registry, because the unsuccessful operations in private practice are often not published. The accompanying mortality table (Table I) is given subject to these reservations.

TABLE I.

Group.	Number of Cases.	Remarks.
Recovery after complete operation ..	10	
Recovery after palliative operation ..	1	Case of multiple cysts.
Died from thoracic operation ..	3	
Died from another operation ..	1	Coincident liver cyst.
Alive, no operation done ..	1	Multiple cysts.

The causes of death in the four fatal cases were: acute pneumothorax, pyo-pneumothorax, abscess of the lung, post-anæsthetic bronchopneumonia. In the last-mentioned case an operation for hydatid of the liver was performed.

In Table II will be found a general analysis of the cases.

Ten of the patients are seen to be either farmers or to have lived amongst sheep and dogs. This number might have been even higher, but some of the case notes are incomplete in reporting this particular.

Nearly half (44%) of the patients are children of eight years or under, the youngest being no more than two and a half years of age. The mortality amongst these little people is high (43%), although two of these cases were of the period before X ray examination was available. The table shows a considerable gap in the age incidence, one group being children and the other adults mostly of middle age. In the light of our later remarks on the rate

TABLE II.
General Analysis of Cases.

Index Number in Registry.	Date.	Locality and Occupation.	Age.	Sex.	Number of Cysts Present.		Other Cysts.	Result.
					Right Lung.	Left Lung.		
187	1933	Victoria, Australia. (Sheep district.)	2½	M.	1	1	0	Died.
407	1891 ¹	Dunedin, N.Z.	4	M.	1	1	1 (Lower surface liver)	Died.
415	1935	Gore, N.Z.	Child	F.	1	3	0	Died.
488	1933	Balclutha, N.Z. (Sheep district.)	6	M.	1	1	0	Recovered.
246	1934	Sydney, N.S.W., Australia. (Sheep district.)	6	F.	1	1	0	Recovered.
—	1936	Wanganui, N.Z. (Not in registry.)	7	F.	1	1	0	Recovered.
620	1932-36 ²	Ashburton, N.Z. (Sheep district.)	8	M.	1	1	1 (Lower surface right lobe of liver)	Recovered.
1084	1937	Adelaide, Australia.	25	M.	1	1	0	Recovered.
951	1936	Wanganui, N.Z. (Farm labourer.)	27	M.	1	1	0	Recovered.
1056	1936	Hamilton, N.Z. (Farm worker.)	32	M.	1	1	0	Recovered.
1041	1931	Hamilton, N.Z. (Lives on farm.)	35	F.	1	1	0	Recovered.
451	1933 ³	Lower Hutt, Wellington, N.Z.	39	M.	1	2	Multiple mediastinal.	No operation.
521	1935	Waiheke Island, Auckland, N.Z. (Sheep farmer.)	44	M.	1	1	0	Recovered.

¹ Cases occurring before X ray examination was possible.

² This child's mother was also operated upon for a liver hydatid.

³ Cases suggestive of multiple metastatic or bronchogenetic dissemination.

TABLE II.—Continued.
General Analysis of Cases.—Continued.

Index Number in Registry.	Date.	Locality and Occupation.	Age.	Sex.	Number of Cysts Present.		Other Cysts.	Result.
					Right Lung.	Left Lung.		
137	1903 ¹	South Canterbury, N.Z. (Sheep farmer.)	55	M.	1	1	0	Died.
1100	1934 ²	Bute, Adelaide, South Australia. (Sheep district.)	56	M.	Multiple.	Multiple.	0	Recovered, palliative operation only. (Died later.)
66	1931	Taranaki, N.Z. Born in Queensland, Australia. (Labourer.)	62	M.	2	1	1 Dome of liver.	Recovered.

Total: 16 cases.

Recovered: 10. Died: 4. Palliative operation: 1. No operation: 1.

¹ Cases occurring before X ray examination was possible.² Cases suggestive of multiple metastatic or bronchogenic dissemination.

of growth of hydatid cysts, this gap in age incidence is suggestive of two periods of infection: one in early childhood, when infection may be contracted from petting of dogs, and one later in life, connected with a working association with dogs in farming activities.

The sex incidence shows twelve males as against four females. But if the cases are considered in their age groups again, it is found that the preponderance of males exists only in the adult group, where, in fact, it is on occupational grounds to be expected. In the childhood group the sexes are about equally liable to infection, both being equally susceptible to the attractions of the canine pet.

In four cases there was more than one cyst in either or both lungs; in one of these multiple cysts were present throughout both lungs, and in the other multiple mediastinal cysts were present. Three patients had simultaneous infection with liver cysts, two of these cysts being on the lower aspect of the liver and one on its upper surface. One of these three was a child, and the mother also had hydatid infection.

TABLE III.
Symptoms and Signs.

Symptoms.	Number of Cases.	Signs.	Number of Cases.
Pain in the chest	14	Dulness on percussion	9
Cough	14	Breath sounds altered or diminished	9
Sputum, purulent	7	Chest expansion or movements reduced	4
Sputum, blood-stained	6	Hydatid material in sputum	2
Fever	9	Bulging of chest wall	1
General malaise, wasting, lassitude	7	Flattening of chest wall	1
Dyspnoea	6	Urticaria	1
Pneumonia	3	Pleuritic friction	2
Vomiting	2	Displacement of cardiac area	2
Cyanosis	1		
Increased respiration rate (before complications)	1		

SYMPTOMS AND SIGNS.

The symptoms and signs in the 16 cases are set out in Table III. The symptoms and signs depend upon two factors: (a) the stage of the disease, and (b) the presence or absence of complications such as infection *et cetera* (see Table V).

Thus the early cyst will give no indication whatsoever of its presence. Somewhat later in the case the most usual association of early symptoms was pain in the chest with a dry cough of the pleuritic type. Sputum and fever are added later, and a perfectly intact and non-infected cyst is capable in most instances of producing in time a copious and purulent sputum, fever and wasting. *Hæmoptysis per se* seems not to have occurred in the series, except to a very small amount in one case; but blood, streaking the sputum, was present in six instances. A copious and serious hæmoptysis may, however, be the only symptom of a lung cyst, as in a recent case of mine.

In view of the fact that these cysts are usually in a fully developed state before operation is undertaken, one might expect dyspnoea to have been a more frequent symptom. Dyspnoea is met with in two forms, either as a shortness of breath on exertion, or as a very urgent and critical attack of short duration, associated with rupture of a cyst.

Recurrent colds or attacks of pneumonia have in some instances led to X ray investigation of the lungs, and to early discovery of the hydatid infection.

A word of warning must be given in regard to X ray diagnosis. In all doubtful cases repeated X ray examination should be made. The smaller cysts can be completely masked by surrounding pulmonitis and may therefore be missed. If repeated examinations are made in two planes, the subsidence of the surrounding inflammation and the growth of the cyst will eventually lead to its identification.

In hydatid countries it is necessary to develop what Sir Louis Barnett calls "hydatid-consciousness" amongst the medical practitioners. These points are illustrated by a recent case of mine in which pneumonia and infection masked a group of three golf-ball cysts for two months. The Casoni test gave a positive reaction, and this led to perseverance and eventual discovery of the cysts.

It is evident that the size and situation of the cysts and the onset of complications will influence the signs to a major extent.

Hydatid material may be found in the sputum, and when it is found, it shows that rupture or leakage into a bronchus has occurred. An occasional attack of urticaria results from absorption of hydatid fluid.

Bulging of the chest wall is not characteristic of a lung hydatid. Sir Louis Barnett has pointed out that bulging of the lower part of the thorax is strongly suggestive of a liver cyst. Flattening of the chest wall occurs occasionally when infection and retraction of lung substance have taken place.

Although definite pleuritic friction is only occasionally heard, the frequency of pain and dry cough indicates that pleurisy often occurs. This must inevitably result when the cyst bulges at the pleural surface of the lung.

In more recent years laboratory tests, such as the complement fixation and Casoni tests, and examinations for the presence of eosinophilia or of hydatid material in the sputum or discharges have proved of value.

LABORATORY TESTS.

The results of laboratory tests in this series are set out in detail in Table IV.

TABLE IV.
Results of Laboratory Tests.

Nature of Test.	Reported Number of Cases.	Results.
Complement fixation test.	5	2 positive (+ +). 2 negative (-). 1 negative (-) with cyst left lung, 1934. positive (+) (slight) cyst right lung, 1936.
Casoni test	7	2 cases positive (+ +). 1 case weak positive (+). 1 case weak positive (+) left lung, 1934. negative (-) right lung, 1936. 3 cases negative (-).
Examination of the blood for eosinophilla . .	7	1 case 1% (no infection of cyst). 1 case 5%, 1934 (no infection). Same case 15%, 1936 (infected cyst). 1 case 9% (cyst not infected). 1 case 10% (cyst not infected). 3 cases nil.
Examination of the blood for leucocytosis . .	3	12,700 per cubic millimetre (infected cyst). 21,500 per cubic millimetre (infected cyst). Nil (cyst not infected).
Presence of hydatid material (membrane, cyst, or hooklets) in sputum.	3	2. One coughed-up cyst. 1. One piece of membrane.
Presence of hydatid material in discharges (sinus)	1	1. Laminated membrane, hooklets and scolices found.

COMPLICATIONS.

The complications in this series of cases are set out in Table V.

There appears to be a great frequency and variety of complications in lung cysts, and, if left long enough, the case is certain to become complicated

TABLE V.
Complications.

Pre-operative.	Number of Cases.	Post-operative.	Number of Cases.
Pneumonia, imperfect recovery	2	Acute early fatal pneumothorax . .	1
Pneumonia, several attacks	1	Pyo-pneumothorax fatal in seven days . .	1
Lung abscess	2	Rupture of another cyst (membrane coughed up)	2
Suppuration of one cyst without rupture . .	1	Infection of residual cavity	2
Suppuration of both cysts without rupture . .	1	Bronchopneumonia (post anaesthetic) . .	1
Suppuration followed by rupture into bronchus	1	Hemoptysis with infection	1
Rupture into bronchus followed by suppuration	3	Chronic lung suppuration, cysts untreated	1
Rupture, urticaria, suppuration	1	Attacks of asthma	1
Rupture, no infection, recurrence of cyst . .	1		
Rupture, no infection, cure	1		
Multiple or bronchogenic dissemination, plus infection	1		

in some way. No case of rupture into the pleural cavity is noted in the series, and no case of mediastinal emphysema, such as occurs when there is fistulous communication between cyst, bronchus and mediastinum at the same time. Such a complication occurred recently in one of my cases, the air rising through the root of the neck and inflating the subcutaneous tissues from the eyebrows to the pubis. This patient recovered after treatment with oxygen per catheter and continuous suction of the cyst cavity by means of a Sprengel's pump.

METASTATIC AND BRONCHOGENETIC MULTIPLICITY.

There are two cases in this series, one with multiple mediastinal and one with multiple pulmonary cysts, which are suggestive of metastatic and bronchogenetic multiplicity. In the latter case, number 1100 in the Hydatid Registry, numerous cysts existed in both lungs, together with an abscess at the right base. In this case, symptoms of "fullness" in the chest and shortness of breath had existed for two years before a right basal infection brought the patient to the Adelaide Hospital. Here the operation of drainage revealed an abscess cavity the size of a hen's egg, containing laminated membrane and hooklets.

Sir Louis Barnett has been good enough to write a note on metastatic and bronchogenetic multiplicity; it is published as an addendum to this paper.

OPERATIVE TREATMENT.

Anæsthesia.

The type of anæsthesia used in the operations in this series is set out in Table VI.

TABLE VI.
Nature of Anæsthetic Used.

Anæsthetic.	Number of Cases.	Ultimate Result.
Chloroform	1	Died.
Chloroform-ether	3	Recovered.
Ether given by the intratracheal method ..	4	{ Recovered, 3. Died, 1.
"Avertin" (alone)	1	Recovered.
"Avertin" plus local anæsthesia	1	Recovered.
Nitrous oxide plus local anæsthesia	1	Recovered.
Local anæsthesia only	4	Recovered.
Not stated	2	{ Recovered, 1. Died, 1.

It was noted in one of these cases that the intratracheal administration of ether failed to prevent a two-thirds collapse of the lung. Local anæsthesia has the advantage that the patient's cooperation in changing his position *et cetera*, is secured; but it is unsuitable for children.

Nowadays the anæsthetic of choice in lung hydatid operations will probably be cyclopropane, given with oxygen under positive pressure. This should considerably reduce the risk of opening the pleural cavity.

Reference to the reduction of this risk by a preliminary induction of pneumothorax is made later on.

Type of Operation.

The different operations used in this series of cases are set out in Table VII.

TABLE VII.
Operation.

Type of Operation.	Method.	Result.
<i>A. Non-Infected Cysts (No Adhesions).</i>		
Evacuate membranes, open drainage.	One stage, one side only.	Died in 7 days from lung collapse and infection.
Evacuate membranes, open drainage.	One stage, one side only.	Died immediately from pneumothorax (child).
Diagnostic needling. Later evacuate membranes and open drainage.	Two stage, both sides.	Recovered (child).
Evacuation and closed drainage.	R. = one stage. L. = two stage.	Recovered.
Tap, 2% formol, evacuate. Open drainage.	One stage.	Recovered.
Tap, formol, evacuate. Open drainage. Deeper cyst needed.	R. = one stage. L. = two stages.	Recovered. Deeper cyst coughed up.
Tap, eosol, evacuate. Open drainage. (One side infected.)	R. = two stage. L. = two stage.	Recovered.
Evacuate membranes, drain rubber dam.	One stage. Slight adhesions noted.	Recovered.
Preliminary artificial pneumothorax (right side). 4 c.c. commercial formalin (40%) injected into cyst. Evacuate, open drainage.	Right side only done.	Recovered.
Tap, evacuate, swab out pericyst cavity with 2% formol. Wound drained. Cavity not drained.	Both sides in double stages.	Recovered. Cyst cavity became infected, wound broke down and discharged pus, after 14 days. Healed finally in 6 weeks.
Manometric needling. Tap and evacuate. Cavity swabbed with flavine. Drainage by rubber dam.	Both sides, in double stages. Extrapleural packing failed to give adhesions.	Recovered.
No operation to lung cysts.	Operation to liver cyst.	Died post-anæsthetic broncho-pneumonia.
No operation at all.	Multiple deep cysts in mediastinum.	<i>In statu quo.</i>
<i>B. Infected Cysts (Adhesions).</i>		
Tap. Open drainage. (Left side infected.)	Left side one stage. Right side old collapse of cyst.	Died from lung abscess around cyst on operated side.
Tap. Open drainage. Both cysts infected.	One stage each side.	Recovered.
Rib resection and drain abscess cavity.	Right side only. Multiple cysts present in both lungs.	Recovered from operation. Unrelieved of hydatids.

The method of approach in all cases is by rib resection. Where the ribs are well separated, as in the axillary regions, the resection of part of one rib may suffice; but where the ribs are more closely crowded, as at their posterior ends, two or three may require division.

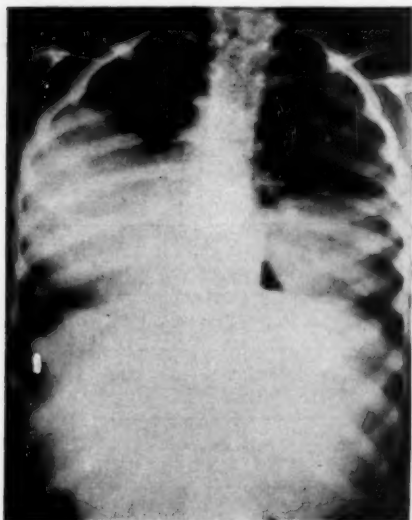


FIGURE I. Case I, October, 1936. Postero-anterior view, showing location of cysts. Observe in subsequent films the rate of growth of the smaller cyst.

irritant substance such as iodine or iodoform. In two cases the packing was done extrapleurally and in two intrapleurally. In none of these cases was good adhesion secured.

More success might have attended the injection into the pleural cavity of an irritating fluid such as sodium morrhuate or quinine-urethane *et cetera*.

The suturing of the parietal and visceral pleura before the former is opened carries a risk of puncturing the cyst when this lies close to the surface, and so of infecting the pleural cavity. It is, of course, usual after evacuation of the cyst to fix or "marsupialize" it in this way by suturing it to the parietes.

Before the cyst was tapped, it was packed off as far as possible from the pleural cavity to prevent infection of the latter.

It will be noted in the table that the cases are grouped into two main divisions: the first includes non-infected cysts, in which adhesions to the parietal pleura are not usually to be anticipated, and the second includes infected cysts, in which such adhesions may be presumed to exist. These adhesions depend upon pleurisy incidental to the infection of the cyst. They were noted in only one non-infected cyst, and then only to a very slight degree.

In four cases preliminary attempts were made to promote adhesions in non-infected cases, in order to minimize collapse of the lung when the thorax was opened at a later stage. The method used was packing with gauze wrung out of an

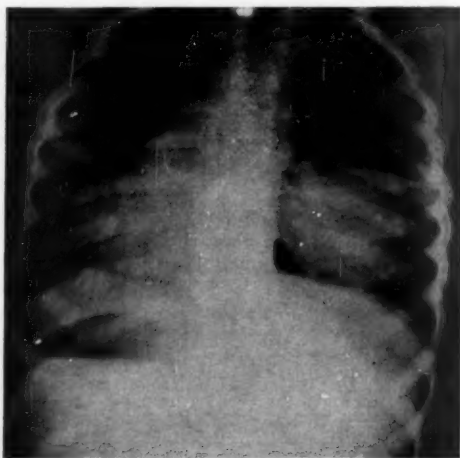


FIGURE II. Case I, February, 1937. Left cyst has been operated on. Right cyst increasing in size.

Marsupialization of the Cyst.

Where adhesions existed, Nature had already carried out marsupialization. In the non-infected cases, however, it was, with three exceptions, attempted. Before an attempt is made to suture a hydatid cyst to the parietes, it is best to aspirate it as completely as possible with the trocar and cannula and so to relieve tension; otherwise the tense hydatid fluid will escape through the needle holes into the pleural cavity. There is only one case in this series in which a manometric reading was taken of the pressure inside the cyst (number 620). This cyst was a comparatively small one, 6.75 centimetres (two and a half inches) in diameter, and the pressure was 130 millimetres of water. The operator commented that there was some leakage around the needle, which would account for the pressure being unusually low.

A useful instrument for rapid evacuation of the cyst is the usual sucker or aspirator attached to the water tap, in association with a gall-bladder trocar and cannula.

The walls of the uninfected cysts were usually thin and rather friable, although one was noted with walls 6.0 millimetres (one-quarter of an inch) in thickness.

Daughter Cysts.

Daughter cysts are always rarities in hydatid disease of the lung, and only one is reported in all these cases. Hooklets and scolices are usually found.

Needling of the Cyst.

Needling of the cyst for diagnostic purposes is now usually unnecessary, but was used in two of these cases. In one there were no after-effects, and in the other the cyst became infected and was later coughed up. It was in an inaccessible position.

Anaphylaxis.

Anaphylaxis, manifested by shock or by urticaria, is a phenomenon that might have been expected to occur occasionally at the operation on the second lung, the patient having been sensitized at the first operation. There are records of urticaria in two of the cases; in one it was associated with rupture of a cyst, and in another several attacks occurred before the cysts were discovered. In this latter case there may have been leakage of cyst contents from time to time or perhaps a small bronchial fistula.



FIGURE III. Case I, July, 1937. Taken shortly before the final operation. No cavity remains at site of left cyst. Right cyst has enlarged and approached the parietes.

Average Time for the Sinus to Heal.

The healing time depends largely on the presence or absence of infection in the cavity. It is not uncommon for healing to occur without suppuration; but nevertheless this should never be presumed upon to the extent that the cavity is closed without drainage, for the wound is likely to break down later, and the total healing time will be increased. The following are some times for healing of the sinus given for non-infected cases: 16, 18, 19, 21, 25, 25, 35 days respectively. In one infected case two and a half months elapsed before healing took place and in two others three months were required for complete healing.



FIGURE IV. Case II, male patient, aged twenty-seven years. January, 1936. Large non-infected cysts. Note the absence of surrounding lung reaction. Wasting, pyrexia and blood-stained sputum were present.

Fate of the Lung Cavity from which the Membranes and Ectocyst have been Removed.

When the cyst has thin walls and is not infected, obliteration of the lung cavity is soon brought about. This is stated to have occurred in patients examined by X rays after periods of four months, ten months, and four years respectively. In a bilateral infected case there was no trace of cavities after seven months.

On the other hand, an old infected cyst with thick pericyst may persist for a long time. In one case submitted to *post mortem* examination in which a cyst had ruptured into a bronchus eight months previously, there was no evidence of collapse of the cavity.

Use of Formol et cetera in Lung Cysts.

Formol solution (2%) was injected in three cases, and eusol in one, in which the cavity was considered to be a closed one. In one of the cases a small quantity (four cubic centimetres) of the fully concentrated formol solution was used. It must be emphasized, however, that there is undoubtedly great risk of formolage of lung cysts as first Dévé and then Barnett have pointed out. One can never be sure that a small bronchial fistula does not exist, and if the formol escapes through this, disastrous symptoms of respiratory embarrassment and collapse are likely to ensue. This actually occurred



FIGURE V. Case II. March, 1936, one month later than Figure IV. A cavity persists where the lower cyst has been removed. The apical cyst is increasing rapidly in size.

in one of the cases in which formol was used and in one in which the cyst was treated with eusol.

In two cases a 2% solution of formol was used to swab out the pericyst cavity under direct vision after extraction of the membranes. An electric light was used, and the observer was satisfied that no fistula communicated with the cavity. The value of this is, however, very doubtful, as the whole essence of the formalin treatment is to kill all the cyst contents before it is in any way disturbed or opened.

RATE OF GROWTH OF LUNG HYDATIDS.

The rate of growth of lung hydatids may be investigated in two ways. One is by comparison of the size of existing cysts in small children with

the probable duration of the infection, and the other is by the preparation of serial X ray films.

Size of Cysts in Children.—In a child of two and a half years the cyst was the size of a mandarin orange. A child of four years had two cysts the size of a duck's egg. A child of six had a cyst at the right base shown as filling nearly half of that lung. Another child of six is shown to have a cyst of the left lung the size of two fists.

Rate of Growth as Shown in X Ray Films.—I have had the opportunity of observing the growth in two cases the films of which are reproduced

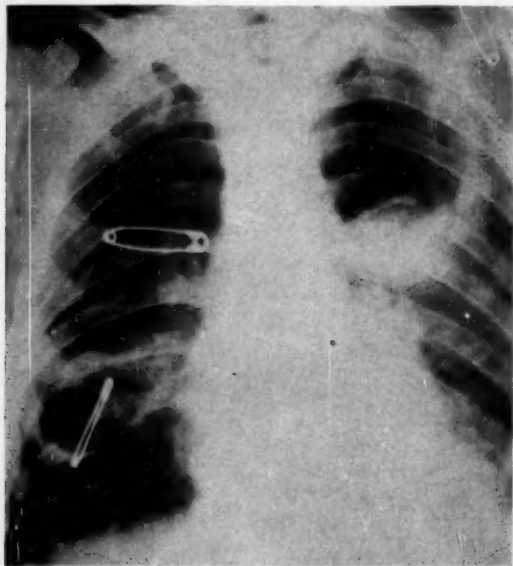


FIGURE VI. Case II, March, 1936, a week later than Figure V. The apical cyst ruptured into a bronchus and was then evacuated. Signs of reaction of the lung to infection are seen round the cyst. Compare with the first film. Both rib resections are clearly seen.

in the accompanying illustrations. In the first case, that of a child of seven years, the diameter of the cyst increased by 18 millimetres (three-quarters of an inch) in four months, and by 31 millimetres (one and a quarter inches) in nine months (see Figures I to III).

In the other case, that of an adult of twenty-seven years, the cyst increased by 18 millimetres (three-quarters of an inch) in diameter in two months. This was a larger cyst than the first seen, and the rate of growth would appear to become accelerated with the increasing size of the cyst, "as though its appetite had grown by what it fed on" (see Figures IV to VII).

Case 620 in the register is a fortunate one for the purpose of this inquiry. When an examination of the chest of this child of eight years was made in 1934 a cyst was present in the left lung, and this was removed. There was

then no cyst in the right lung. When another X ray examination was made in 1936 (two and a half years later), there was a cyst in the right lung 6.75 centimetres (two and a half inches) in diameter.

Follow-up records are not available for more than a very few of these cases. One of the most interesting points which might be solved by such records would be the question of implantation cysts, in view of the fact that formolage as a prophylactic cannot safely be carried out in lung cysts.



FIGURE VII. Case II, July, 1936. Complete recovery. Both cavities have now disappeared from the lungs.

SUMMARY.

It is obvious from a study of the above cases, in which the patients were nearly all treated by different surgeons, that the accepted treatment is by resecting portion of a rib or ribs over the cyst as localized by X ray examination, by evacuation of the mother membranes after complete tapping, and then by fixation of the cyst wall to the parietes with a drainage tube *in situ* for five to ten days or until such time as the discharge disappears. That is to say, in most of these cases treatment has consisted of open drainage. Only one patient received closed drainage; that is, an airtight junction of tissues was made around the tube, which was carried into a pail of lotion under the bed. Provided the hydatid membrane had been completely removed, this would hasten the recovery of the pneumothorax which occurs inevitably in all the cases. In this case, too, an attempt was made to aspirate the pneumothorax through the chest wall, with considerable improvement.

The pneumothorax could quickly be controlled by the use of one of the modern suction forms of apparatus, such as the electrical apparatus described by Bennett Jones in *The British Medical Journal* of September 25, 1937, or the steam-actuated suction shown by Doyle in *THE AUSTRALIAN AND NEW ZEALAND JOURNAL OF SURGERY* of October, 1937. The use of cyclopropane-oxygen under positive pressure may prove to be the best solution, as already mentioned.

Since the distress attendant on a pneumothorax depends largely upon the suddenness with which it arises, there seems to be a good argument for the induction of an artificial pneumothorax a few days before the pleural cavity is opened. This was successfully carried out in one of the cases. The use of a pneumothorax might also accelerate the progress of a deep seated cyst towards the pleural surface, and shorten the time of waiting before the operation is carried out.

Deep seated cysts are best treated by delay until the growth causes them to approach the pleural surface, if they are kept meantime under serial X ray observation. The period of waiting is fraught with danger of rupture, either by pressure-erosion of a bronchus or by infection, with consequent sudden increase in size of the cyst. Both these complications are freely illustrated in this series of bilateral pulmonary hydatids. When a cyst has ruptured, the incompleteness of natural evacuation and the presence of toxæmia are indications for operative intervention.

ACKNOWLEDGEMENTS.

I have to express my indebtedness to the Hydatid Registry of Australasia for having permitted me to review this series of cases, to Sir Louis Barnett for his helpful comments and suggestions, and also to Dr. G. H. Robertson, of Wanganui, who kindly obtained for me a bibliography from the Royal Society of Medicine, dealing with hydatid cysts occurring in both lungs. As time goes on and further cases are added to the Hydatid Registry, a valuable and authoritative addition to our knowledge of hydatid disease will be secured.

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ADDENDUM.

(Sir Louis Barnett.)

F. Dévé more than thirty years ago showed experimentally that multiple cysts of both lungs may be brought about in two very unusual ways:

(1) By metastasis due to dissemination of scolices from a primary hydatid cyst of the heart which has leaked into the right auricle or ventricle, or from a primary cyst elsewhere, say, of the liver or pelvis, which has leaked into a large vein. Clinically such cases are very rare, because when a hydatid cyst does break into a large vessel (in itself a rare occurrence) speedy death usually ensues from hydatid embolism, hæmorrhage, anaphylaxis, toxæmia and so on.

(2) By the bronchial distribution of scolices from a leaking primary pulmonary cyst. Usually these scolices are coughed up, but some may get a precarious hold in the alveolo-bronchial tissue of both lungs, and develop later into multiple cysts.

Only about a score of the metastatic and half a dozen of the bronchogenetic type are so far on record in the world's literature as authentic clinical examples (Dévé, "*Trente deux années d'étude de l'échinococcose*", pages 19 and 128, Las Ciencias, Buenos Aires, 1933). The X ray findings in the case referred to, number 1100, in the registry suggest the bronchogenetic type of multiplicity. I received a follow-up report recently from Dr. Southwood, of Adelaide, stating that he had heard from a country practitioner that this case ended fatally from pneumonia some five months after operation. This death will therefore modify to a certain degree Dr. Christie's mortality estimation in his series of records. Other cases of bronchogenetic multiplicity have no doubt occurred in the experience of practitioners, but their true nature has not been recognized. The possibility of this rare type of secondary dissemination subsequent to hydatid vomica should be borne in mind.

CLOSURE OF THE BLADDER.

By W. A. HAILES,
Melbourne.

WHEN we consider closure of the bladder in surgery of the prostate gland, two questions at once arise: (1) What is to be gained by closure of the bladder at the time of operation? (2) Is closure of the bladder associated with any increased risk to the patient?

In an ideal case, and with the employment of perfect technique, closure of the bladder and the use of an indwelling urethral catheter achieve dependent drainage and a relatively dry bladder, healing is facilitated and convalescence is shortened. The bladder is drained at its lowest part and not at its highest, as it is when suprapubic drainage is used, and thus an accumulation of stagnant urine and pus in the lower segment of the bladder is avoided.

The morbidity and mortality are influenced by the spread of infection from the prostatic bed to the renal tract or to the pelvic cellular tissues; in these circumstances healing is delayed and convalescence is very often prolonged by the chronic cystitis which results. The toxæmia in these old people is very debilitating, and the gross pyuria is distressing for a varying period after the patient has been discharged from hospital.

The advantage of urethral drainage can be obtained to some degree by the combination of suprapubic and urethral drainage. This is now the method which I usually adopt, but in my experience urethral drainage functions better with a closed than with an open bladder.

It has been my experience that in any series of cases, regardless of the type of operative method used, the degree of cystitis following operation when the patient has been adequately prepared depends on: (a) the avoidance of unnecessary trauma and the elimination of foreign bodies from the bladder; (b) adequate drainage with elimination of a cesspool in the lower quadrant; (c) later, complete relief of obstruction and absence of residual urine.

The beneficial results which can be obtained in an ideal case when a perfect technique is used and the bladder is closed, can be achieved in part with suprapubic drainage by: (a) the use of forced fluids; (b) lavage *per urethram* by hydrostatic pressure or through the indwelling catheter, if one be present; (c) the use of urethral as well as suprapubic drainage.

Is closure of the bladder associated with any increased risk to the patient? In my hands it unquestionably is. The risk is that of inadequate drainage, which causes temporary attacks of retention, with or without infection. It will be said that infection should not be present; that is to me the crux of the problem, and will be referred to later.

Without gross infection the risk from transient or temporary retention of urine may not be great, but the pain and discomfort are distressing to the patient, and, while it is true that in some cases the obstruction can be

cleared by lavage, in others the bladder must be opened. It is surprising how little will block the urethral catheter.

The efficacy of a catheter depends not on its size as measured by a catheter gauge, but on the calibre of its lumen.

A sectioned number 11 catheter is useful for this demonstration. Small clots from the edges of the reconstructed vesical floor will suffice to block the lumen when the technique has been almost perfect and thus spoil a successful operation. Reopening of the bladder without an anæsthetic is admittedly easy, but is not altogether appreciated by the patient.

An indwelling catheter implies some degree of urethritis and infection; the inflamed urethral mucosa and the traumatized prostate bed and bladder are continuous, and the ease with which a rigor occurs is sufficient evidence that a temporary blockage of the catheter may be a menace.

McK., a male patient, aged sixty years, gave a history of two years' difficulty and frequency with micturition, progressively increasing; his bowel frequently acted when he passed urine. He had never suffered from hæmaturia or retention of urine. Examination of the rectum revealed a large soft uniform prostate. The residual urine was 450 cubic centimetres (fifteen ounces). The urine was clear, no pus cells being found in a centrifuged specimen.

On March 4, 1936, prostatectomy was performed without difficulty by the Harris technique; the bladder was closed.

On March 5, 1936, 1,200 cubic centimetres (forty ounces) of urine drained in twenty-four hours.

On March 6, 1936, 1,080 cubic centimetres (thirty-six ounces) of urine drained in eighteen hours, and then the patient complained of pain and drainage ceased; lavage proved ineffective. The patient had a rigor and the bladder was immediately opened; a little urine, but practically no clot, was found in the bladder; a few shreds and minute clots were present. A small drain was inserted, the wound was closed, and the patient was quite dry twenty-one days after operation. He was discharged from hospital with no residual urine, and has remained well since. The bowel function is normal.

Had the bladder been full of clot, I should have considered it a gross error in technique. As it was, I was only convinced again of the risk attached to vesical closure.

INFECTION.

In considering the question of infection, each surgeon must decide for himself: (a) Can infection in the urinary system be controlled in all cases by catheter drainage and is recrudescence liable to occur? (b) If infection cannot be controlled in all cases by catheter drainage, is it possible to select clinically, or by any other means, those patients whose condition will respond to catheter drainage and those who will require suprapubic drainage before operation?

On this problem it is well to know that those interested in urology differ. Frankly, I cannot control all cases of infection by catheter drainage, but I can pick early those patients who will not do well, or who indeed will die if subjected by me to continued catheter drainage. In my hands a large percentage of these patients can be brought through a successful prostatectomy if they are submitted to a preliminary suprapubic drainage.

It is not my place to discuss that aspect of the clinical story—that is, the pre-operative treatment—but many of these patients have some degree of pyelonephritis which responds to treatment; relapses are common, and, indeed, are to be expected at any time after any degree of urinary infection. Why, therefore, run the risk after a severe operation of endeavouring to

treat by catheter drainage a condition such as renal infection, occurring unexpectedly, which often fails to respond to catheter drainage before operation? After operation temporary blocks are more liable to occur, apart altogether from gross faults in technique.

There is always the risk of not being available as soon as temporary blockage occurs; pain then is real and rigor is apt to follow quickly. I have repeatedly said I will not again close a bladder, but I still occasionally do. I become more convinced each year that in doing so I am wrong. In my hands, as a principle, closure is contraindicated in any case in which there is a history, or there are signs, of recent urinary infection, even if the infection is quiescent.

What is the fate of those plain catgut sutures? What is the state of the bladder base when the catheter is taken out? In my hands I feel sure that those plain catgut sutures are hæmostatic. Interested in plastic surgery, in other regions I could not often achieve primary union under similar conditions.

If in any percentage of cases primary union is not achieved, the cavity is closed by contracture of the prostatic bed and vesical base; there is then a granulating area continuous with an inflamed and patent urethra. It is doubtful whether it is wise to allow such a bladder to function normally as soon as ten days after operation, though figures seem to indicate that it is quite safe to do so.

With a Harris exposure and technique and a small drain tube the convalescence is not unduly delayed. Some will say that an extra period of seven to ten days matters. It must, however, be remembered that not all those bladders closed stay closed when patients are allowed to sit out of bed on the tenth day.

From what has been said, it will be obvious that in my hands closure of the bladder in a second stage prostatectomy is contraindicated, either on account of the infection for which the suprapubic cystostomy was performed, or on account of the inflammation which followed the drainage. With that risk there must be free drainage at all times.

STATISTICS.

In my last 26 cases, in none of which the bladder was closed, there have been three deaths.

In the 23 successful cases the suprapubic wound was dry, if not absolutely healed, in an average period of twenty-two days. The patients who died were all hospital patients, aged respectively seventy-six, seventy-seven and seventy-eight.

The first case of the series was a tragedy; a severe cellulitis of the axilla followed the submammary injection of saline solution, and the patient died twenty-one days after operation from the toxæmia and sloughing. The suprapubic wound was practically dry and urine was passed easily *per urethram*.

The second patient in the series died four weeks after a second stage prostatectomy performed under epidural and local anaesthesia supplemented with a little gas and oxygen. All that can be pleaded in extenuation was the physical condition: the patient was very stout and the operation exceedingly difficult; in fact, it was almost impossible when the age and the patient's limit of tolerance were considered.

For the third there is no extenuating circumstance.

It may be urged that immediate mortality is not the only factor in the discussion on the relative merits of closure or suprapubic drainage. In my experience with the two methods there does not seem to be any difference in the incidence of: (a) second vesical calculus formation; (b) vesical neck obstruction; or (c) the incidence and severity of persistent urinary infection. The last mentioned has been a troublesome and often a persistent feature with both methods.

There has been no instance of tent formation or vesical neck obstruction following the use of Harris sutures at the vesical neck in either the closed or open cases.

The late Mr. Harry Harris has been my guiding star in prostatic surgery since the Melbourne Congress in 1923. In turning away from one of his ideals, "prostatectomy with closure of the bladder", I have only done so because in my hands I think my patients are safer by my so doing, and not in criticism of any other work.

The admiration that I had for Harry Harris in 1923 increased each year. I admired his outlook and the thought which he expended on these cases, the time and enthusiasm devoted to the perfecting of new and better instruments and technique, the inspiration that he was to all who were interested, and his help which was always available. I can only say with James Harvey Robinson:

Few of us are capable of creative thought, but more of us can distinguish it from other and lesser types of thought and can bestow on it the esteem that it merits, the greatest treasure of the past and the main hope of the future.

PROSTATIC OBSTRUCTION: THE QUESTION OF EARLY OPERATION.¹

By RICHARD G. S. HARRIS,
Sydney.

THAT the sufferers from prostatic obstruction are seldom advised to seek surgical treatment until urinary retention has occurred, is a deplorable and an unforgivable reflection on our profession. That cardiac and renal pathology should be allowed to accumulate, and that mental and physical distress, occasioned by the enforced interruption of social activities and loss of sleep, should be tolerated, are beyond my comprehension.

It would seem that the dangers associated with the operative treatment of prostatic obstruction are still grossly exaggerated. It cannot be appreciated that there is a mortality rate of only about 3% associated with the most modern methods of prostatectomy, and that this figure surely compares favourably with that obtained in any other branch of surgery. Again, it cannot be recognized that even this low mortality rate would be capable of still further improvement were patients referred in the earlier stages of the disease. Unfortunately the majority are in their late sixties or early seventies, cardio-renal damage has already progressed, and they have become poor surgical risks. The improvement in general condition that can be effected by cooperation between physician and surgeon is not sufficiently understood, and the importance of adequate pre-operative treatment in the relief of renal back-pressure is not fully realized. Unless one has had actual experience of the Harris operation, or of resection by the transurethral route, and has observed the ease, comfort and absence of pain associated with the convalescence following such operations, the advantages of these techniques cannot be appreciated.

The remedy would appear to lie in the hands of those associated with the universities and teaching hospitals. The far-reaching effects of delay in the treatment of urinary obstruction, and the inevitably progressive nature of prostatic disease, should be impressed indelibly upon the minds of students. The latest advances in operative treatment, with the associated low mortality rate, should also be emphasized.

Urological opinion is unanimous on the necessity for operative interference in the early stages of prostatic obstruction, long before any marked degree of retention has occurred. There is, however, some difference of opinion in regard to the criteria that determine when this step should actually be undertaken, and as to what method of treatment should be employed.

I believe that we should be guided by the severity of the symptoms that are present, by the amount of interference with social activity that is enforced, and by the development of residual urine, which I consider of paramount

¹ Delivered at the symposium on "Prostatic Obstruction" on the occasion of the eleventh annual meeting of the Royal Australasian College of Surgeons, held at Sydney, March, 1938.

importance. We must also be guided by the clinical pathology that may be revealed either on rectal or intravesical examination, as there are many patients with comparatively mild symptoms and signs, in whom there will be found gross changes in the prostate gland.

Transurethral resection has placed in our hands a method of treatment which can be utilized at a somewhat earlier stage, in selected cases, than can suprapubic prostatectomy. Whether partial removal of the prostate, however, will give lasting results, and so prevent the onset of cardio-renal damage, is at present undetermined. Routine indiscriminate resection must be deprecated.

At the onset of the disease the most important symptoms are some delay in the commencement of micturition, and some dribbling at the end of the act. With these symptoms may be associated diminution in the force and size of the urinary stream, whilst occasional nocturia is experienced. Pain is rarely an early symptom, though attacks of renal colic, the so-called "reflux renal colic", are not uncommon. These symptoms are governed in part by the quantity and nature of the patient's fluid intake, and are frequently affected by atmospheric conditions. It may be some years before local discomfort and distress become manifest, and I do not consider operation at this stage either necessary or warranted. The symptoms are usually transitory, but tend, as time goes on, to recur at shorter intervals, and to extend over longer periods. As the disease progresses the nocturia and difficulty become more pronounced, and mental and physical anguish are occasioned by the loss of sleep and the interruption of social activity. The stage is reached when the bladder is never completely emptied, renal back-pressure becomes established, and infection of the residual urine is liable to occur at any time. Pelvic congestion frequently precipitates attacks of complete retention of urine, which are, however, generally of short duration. It is unusual for residual urine, when once established, to disappear, and it is from the presence of this residuum that the greatest danger lies. Continued renal back-pressure, with the associated faulty elimination, and attacks of infection and congestion all play their part in the ultimate cardio-renal syndrome. I believe that when residual urine has become established, operation is an imperative necessity, and should not be deferred. This I regard as the one most important, and the deciding, factor as to the time to operate.


Other symptoms must be evaluated at their true importance. Delay both at the commencement and at the end of micturition, and diurnal and nocturnal frequency, depending on the mental and physical reaction of the individual, should be dealt with at the appropriate time, and should neither be allowed to make life a burden, nor to progress so as to become a potential danger. Diminution in the size and force of the urinary stream gives some indication of the amount of back-pressure which is being established, and of the presence or absence of residual urine. The degree of difficulty of micturition experienced by the patient also gives some idea of the progress of the disease.

The findings on rectal examination, in the absence of gross pathology, cannot be taken as a guide for operation. Cysto-urethroscopic inspection alone, in these cases, can determine the amount of obstruction, and will show the presence or absence of definite indications of the necessity for early operative interference. Occasionally reflux renal colic recurs with such frequency and

force that operation, even in the absence of gross pathological changes in the prostate, must be undertaken.

To summarize the foregoing remarks, I would direct particular attention to the presence of residual urine, which I regard as the prime factor in determining the need for surgical interference. In the absence of residual urine there are other factors which may make early operation imperative. Frequent, difficult and painful micturition are symptoms which, in view of the physical and mental distress which they produce, must be given due consideration.

Finally I would suggest that the attention of both graduates and undergraduates should be directed to the dangers of deferring operation on the sufferers of prostatic obstruction, and I submit that further time should be allotted to the theoretical and clinical practice of urology in general, in our teaching hospitals and in our universities, so that diseases of the urinary tract, which are so commonly encountered in general practice, may be combated by a wider and more specific knowledge. Some indication should also be given the public of the relative safety and the lack of physical discomfort associated with the modern surgical techniques.



Surgical Technique.

THE TECHNIQUE OF SUPRAPUBIC CYSTOSTOMY BY BLADDER PUNCTURE WITH TROCAR AND CANNULA, AND THE MANAGEMENT OF THE PERMANENT SUPRAPUBIC CYSTOSTOMY.

By A. FAY MACLURE AND C. A. MARSHAL RENOU,
Melbourne.

THE operation of suprapubic cystostomy is one which confronts the surgeon, either as an emergency measure for the relief of acute urinary retention, or as a more deliberate procedure in the absence of retention, for conditions which require either temporary or permanent drainage of the bladder.

This operation may be performed by deliberate section of tissues, layer by layer, with the aid of retraction, and therefore under vision; or it may be performed as a stab operation with a trocar and cannula. The latter method, which will be described here, has the advantages of speed, a small skin incision, the minimal interference with tissues, and a water-tight wound.

It is safe in careful hands, and is easily performed under local anæsthesia. It is a means of giving permanent relief if so desired.

Indications.

This operation is indicated in any pathological condition of the bladder, prostate or urethra in which temporary or permanent drainage of the bladder is advisable.

1. As the first stage of a two-stage prostatectomy, when the suprapubic drainage is retained until the kidney function has recovered, and until gross bladder infection has been relieved, when the prostate may be removed.

2. To ensure permanent relief in the presence of irremovable urinary obstruction, such as malignant disease of the prostate or hopelessly advanced or neglected urethral stricture.

3. As an aid to other operations, for example, before plastic operations upon the urethra, to keep the operative field dry and aseptic, whilst healing takes place.

Contraindications.

For the operation to be performed safely the distended bladder must extend well above the *symphysis pubis*, otherwise there is risk of peritoneal penetration and intestinal injury by the passage of the trocar.

The only contraindications, therefore, to the operation are when this risk cannot be entirely eliminated, for example, in men with very fat abdomens, or when previous suprapubic or lower abdominal operations have been performed, when the likelihood of the lower abdominal parietal peritoneum being adherent may exist.

Instruments.

The instruments required are illustrated in Figure I, and consist of: (a) Two pairs of Lane's tissue forceps. (b) A tenotome. (c) A straight trocar and cannula. The cannula should be 12.5 centimetres (five inches) long at least, with an inside diameter of 6.0 millimetres (one-quarter inch); this will comfortably accommodate a number 10 English rubber catheter. (d) A metal self-retaining catheter introducer. (e) A wooden catheter spigot; this may be easily made from the tapering end of a wooden pen-handle. (f) A number 10 English Casper self-retaining rubber catheter.

Technique of Operation.

The bladder is emptied by urethral catheter, irrigated with sterile water which is introduced by funnel and tube, and filled with fifteen ounces of sterile water, or as much as is necessary to make it tense. The catheter is now withdrawn, and the

presence of a distended bladder extending well above the *symphysis pubis* is confirmed by palpation and percussion.

The skin in the mid-line, 2.5 centimetres (one inch) above the *symphysis pubis*, is infiltrated with 2% "Novocain" solution, a bleb about 1.25 centimetres (half an inch) in diameter being raised. Two other blebs are raised one inch above and below this initial bleb, and the skin in each of these latter situations is seized with a pair of Lane's tissue forceps. These are retracted one from the other by the assistant, the skin through which the trocar will pass being rendered tense. The assistant

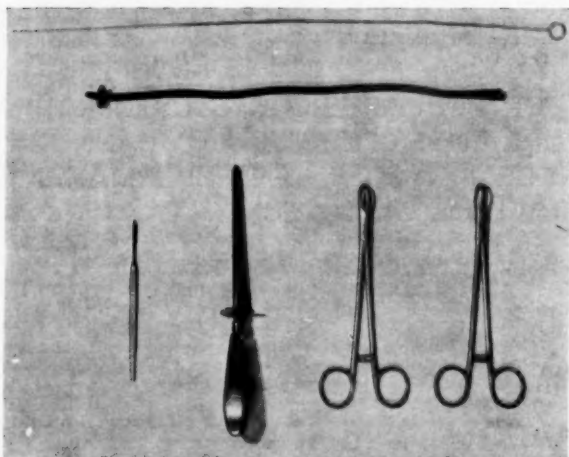


FIGURE I.

maintains this tension until the operation is completed.

The tissues underlying the central bleb are infiltrated with 0.5% "Novocain" solution along the proposed track of the trocar to the loose cellular tissue surrounding the bladder. It is important to avoid piercing the bladder wall during this procedure because of the risk of urinary leakage and subsequent perivesical infection.

A vertical stab 1.25 centimetres (half an inch) long is made through the skin with the tenotome at the site of the central bleb. The trocar and cannula are pushed firmly through this incision, the thumb of the introducing

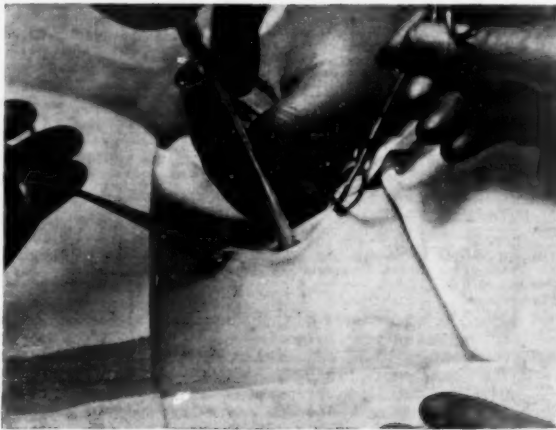


FIGURE II.

hand extending along the cannula and acting as a safeguard against too deep insertion. As the instrument passes through the *linea alba* a definite resistance will be felt, and will be encountered again as the bladder wall is pierced. All sense of obstruction to the passage of the instrument disappears when the bladder is entered (Figure II).

The cannula is held firmly in position with the left hand, the trocar is withdrawn, and urine will commence to flow. The flow is checked quickly by the left thumb, which

is held in position until the self-retaining catheter, already stretched on its introducer, is inserted (Figure III).

After insertion of the catheter the introducer is withdrawn and urine commences to flow through the catheter. The cannula is now withdrawn slowly over the catheter, and, if difficulty is experienced in withdrawal, the expanded end of the catheter should be cut off, as every care must be taken to maintain the catheter in position (Figure IV).

The Lane's forceps are removed. The catheter is withdrawn gently until its self-retaining end impinges against the anterior wall of the bladder. It is now fastened to the anterior abdominal wall with two strips of adhesive plaster, no dressing being necessary for the wound. The wooden spigot is placed in the catheter and the patient is returned to bed.

After-Treatment.

It is a well-established fact that following the relief of urinary retention, acute or chronic, certain patients manifest



FIGURE III.

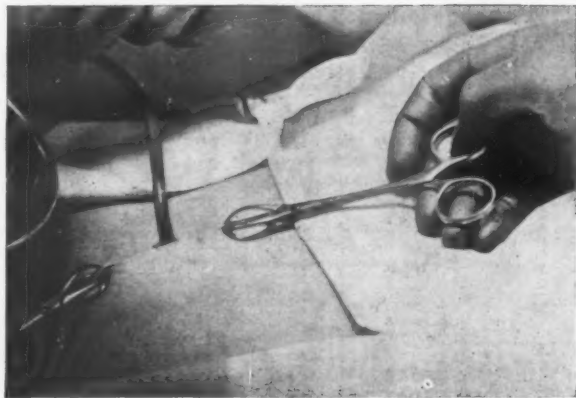


FIGURE IV.

reactionary renal hyperactivity, with a resultant polyuria. This phase, if it develops, is immediate in onset, and may last for three or four hours.

During this period the spigot should be released at hourly intervals to empty the bladder; but once it has passed, four-hourly emptying is all that is necessary.

It is the aim, during the after-treatment period, to prevent the bladder from becoming overfilled, and its content should never at any time be allowed to exceed 300 cubic centimetres (ten ounces).

The bladder is irrigated daily with some simple lotion, such as boracic acid or oxycyanide of mercury (one in 8,000 solution); but, should gross vesical infection be present, regular bladder irrigations three times daily must be carried out until the infection is controlled. This is performed best by funnel and tubing connected to the catheter by a glass nozzle. Only four or five ounces of lotion are introduced at a time. This is siphoned off, and the procedure is repeated until the returning fluid is clear.

By the tenth day the track from the skin to the bladder will have consolidated sufficiently to allow the withdrawal of the self-retaining catheter and the easy insertion of an ordinary rubber catheter of the same size.

If the cystostomy is to be permanent, the catheter is maintained in position by a rubber flange through which it is threaded before it is introduced into the bladder. This flange is made of three millimetre (one-eighth of an inch) sheet rubber cut as an oblong 7.5 centimetres (three inches) wide by 5.0 centimetres (two inches) long. A hole is punched out of the centre with a leather punch and should be of such a diameter to allow the catheter to be gripped tightly when it is threaded through.

When the tip of the catheter has entered the bladder, it should project a little way into its cavity, the distance of the tip of the catheter from the rubber flange being 10.0 to 11.25 centimetres (four to four and a half inches) in the average case. This ensures that the tip of the catheter remains in the bladder cavity and is not displaced during coughing or other abdominal muscle movements.

Permanent Stage.

Before the patient returns to his home he is taught how to change the catheter and flange, how to irrigate his own bladder, and how to sterilize by boiling the instruments necessary for the procedure, so that he is capable of carrying out his own bladder toilet.

For this purpose the barrel of an ordinary glass urethral syringe is more simple than a funnel and tube, its end fits directly into the end of the catheter, and it can be controlled quite easily by the patient himself.

He is given a Winchester jar, which he fills with boiled water and to which he adds boracic acid crystals until some remain undissolved at the bottom of the bottle.


From day to day, as the bottle content diminishes, it is kept filled with boiled water, and more crystals are added as required, a sterile saturated solution thus being constantly at hand.

Four or five ounces of solution are removed from the bottle and diluted with four times the volume of boiled water. This dilute solution is used for the actual daily irrigation.

He is instructed to change the catheter at weekly intervals, and to facilitate this he is given a spare catheter and flange.

If a portable urinal is desirable, one may be quite simply made from portion of an inner tube of a bicycle tire by sealing one end. This is suspended from a linen abdominal belt which fits over and helps to anchor the catheter flange.

Under this regime a patient may carry on indefinitely in perfect comfort. No urinous smell is present, and he remains in a dry condition. He is able to pursue his everyday affairs, and he is no longer confined to his home.



Case Reports.

RUPTURED HYDATID CYST OF THE HEART.

By T. H. PULLAR,
Pathologist, Palmerston North Hospital,

AND

J. H. NORTH,
Medical Superintendent, Palmerston North Hospital, New Zealand.

WE report here a case of rupture of a hydatid cyst of the heart. The presence of the cyst was not suspected before death, the condition being found at autopsy. The rarity of the case seems to merit a brief report.

History and Clinical Particulars.

The patient, C.P., aged eighteen years, was a jockey's apprentice. He was admitted to the Napier Hospital on November 20, 1937, following a head injury received in a fall from a horse. The records of this admission have been made available. He had a relatively mild head injury with a scalp wound over the right parietal bone. He was not unconscious on admission, and an X ray examination of the skull revealed no fracture. During routine examination a cardiac lesion was found. There was a diffuse and heaving cardiac impulse with its centre about the nipple line and a loud musical murmur which could be heard without the stethoscope, systolic in time. In the early stages of his stay in hospital numerous missed beats were noted. An X ray examination of the chest was made, and the film shows that the heart shadow was greatly enlarged, mostly owing to enlargement of the left ventricle. His temperature was above normal during his stay in the Napier Hospital for over a week, and this fever was regarded as rheumatic in origin. He was discharged from hospital after five weeks' treatment in moderately good health. He had no cerebral symptoms and was not short of breath on mild exertion.

On December 30, 1937, one week later, he was admitted to the Palmerston North Hospital. He had been found unconscious in a horse stall at the racecourse. There was no definite history of injury, though the question of an assault was raised by the doctor who attended him at the racecourse. On admission he was deeply unconscious and his breathing was stertorous. There was no mark of external injury on the head. There was slight bleeding from the mouth, and the upper lip was swollen and had a small cut on its inner surface; his temperature was 38.3° C. (101° F.), his pulse rate was 140, and his respirations numbered 28. Examination of the heart was difficult owing to his stertorous breathing. Enlargement of the heart and the presence of a loud murmur were noted; timing of the murmur was not possible. The only other feature noticed on general examination was the extreme pallor and coldness of both legs. A lumbar puncture was performed; the cerebro-spinal fluid was clear and normal. The patient died an hour after admission, no definite diagnosis having been made. No special hydatid tests were carried out either during his stay at Napier Hospital or after his admission to Palmerston North Hospital.

Post Mortem Findings.

Post mortem examination was made by one of us (T.H.P.) on December 31, 1937, nineteen hours after death.

The body was that of a lightly built youth, apparently sixteen or seventeen years of age. *Rigor mortis* was present. There was no urticarial eruption. A small healed scar was found in the scalp on the vertex of the head.

The sternum was slightly retracted and the costal cartilages were bent inwards. The lungs were normal and contained no hydatid cysts, and there were no pleural or pleuro-pericardial adhesions. The thymus was larger than the average at this age. The oesophagus and trachea were normal.

Heart and Blood Vessels.—The pericardial sac was completely obliterated by old avascular fibrous adhesions. No hydatid cysts were found between the two adherent layers of the pericardium, and the appearance was similar to that which would be produced by a former attack of rheumatic pericarditis. The heart was considerably enlarged, chiefly by hypertrophy of the left ventricle.

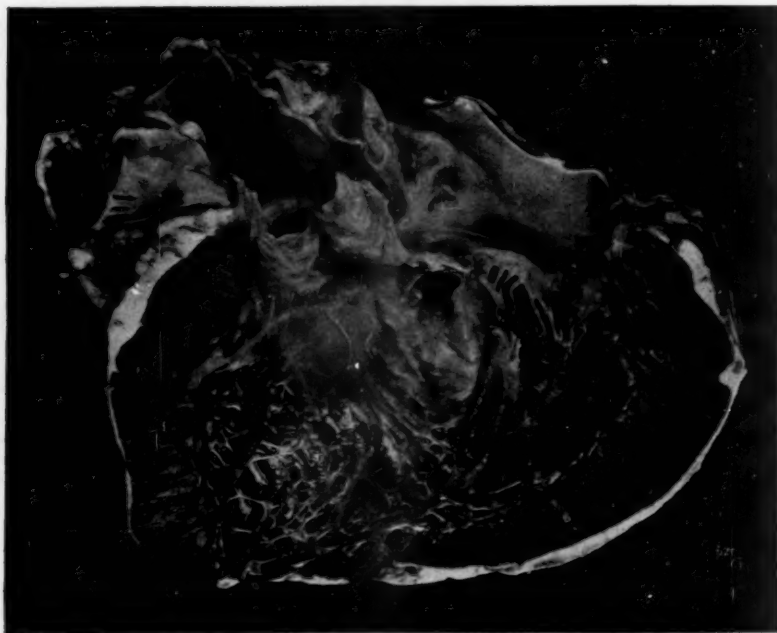


FIGURE I. Anterior view with heart opened, showing orifice of rupture of the cyst into the left ventricle.

In the posterior wall of the heart there was an irregularly spherical cavity five centimetres in diameter, with fibrous, wrinkled, partly collapsed walls. This cavity was empty and communicated with the left ventricle by a ragged, roughly circular opening about one centimetre in diameter. Looked at from the front, this aperture was seen to be situated just to the left of the upper posterior part of the interventricular septum, and was partly covered by the medial cusp of the mitral valve. The anterior wall of the cavity was formed by the endocardium and a thin layer of muscle and fibrous tissue. The rupture into the left ventricle had occurred recently, and there were no thrombi deposited about the edges of the aperture. Photographs of the anterior and posterior aspects of the cyst are shown in Figures I and II respectively, and Figure III represents diagrammatically the conditions found. The cusps of the mitral valve were slightly thickened and scarred, and the valve was incompetent. The aortic valve was normal.

The thoracic aorta was normal and contained no emboli, nor were any found in the carotid, subclavian or innominate arteries. The abdominal aorta, however, was plugged with whitish and gelatinous-looking material from the level of the first lumbar vertebra down to the bifurcation. The common iliac arteries were also blocked for about the first two inches of their course, and the orifices of the renal arteries were obstructed. On examination, this embolic material was found to consist of collapsed and folded hydatid ectocyst and daughter cysts. Typical hydatid hooklets were found on microscopic examination, but no scolices could be seen.

Liver.—The liver contained no hydatid cysts, but there was extensive fatty degeneration with a curious patchy distribution.

Spleen.—The spleen was slightly enlarged, firm and congested. The lymphoid follicles were very large and prominent, and some small areas of perisplenitis were present.



FIGURE II. Posterior surface of heart. Cyst opened by dissection to display cavity.

Kidneys.—The kidneys showed evidence of a former acute glomerulo-nephritis.

Mesenteric Lymph Glands.—The mesenteric lymph glands were enlarged and soft, not tuberculous. The other abdominal and pelvic organs were normal.

Skull and Brain.—No fracture of the skull was present, and no old or recent hemorrhage was found anywhere. The brain was under increased pressure and bulged on opening the *dura mater*. The whole brain was very soft and oedematous, but there were no infarcts and no hydatid cysts were present.

Comment.

In spite of the rarity of hydatid cysts of the heart, the number of cases reported is greater than one might expect. In 1928, in a comprehensive review of the literature,⁽¹⁾ Dévé was able to collect and analyse 137 authentic cases, including 18 reported from Australia.

According to Dévé, left-sided cysts are more common than those in the right side of the heart, but the thinner wall of the right ventricle renders it more liable to rupture from an intramural cyst. He stresses the fact that a hydatid cyst of the heart is usually not accompanied by cysts in any other organ; in 82% of the cases reviewed by him the cardiac cyst was the only one found. He concludes that the cyst is always primary in the heart. The older writers on the subject (Huchard, Vaquez) stated that hydatid cysts are commoner in the right side of the heart than the left because the embryo is carried there via the inferior *vena cava*.

Dévé, however, finds that cysts are more frequent in the left side, and asserts that in all cases the echinococcus embryo reaches the heart wall by way of one of the coronary arteries. There certainly does not seem to be any reason why the embryo should become implanted in the wall of the right auricle or ventricle, instead of being carried on into the pulmonary circulation.

Of 90 ruptured cardiac hydatid cysts, records of which were collected by Dévé, 20 ruptured into the pericardium, 38 into the right side of the heart, and 32 into the left side. Dévé points out that there are five possible sequels to intracardiac rupture: (a) Resolution may occur without complications; the evidence for this possibility is purely experimental. (b) Sudden death may occur from anaphylactic shock, without embolism. (c) Sudden death may occur from gross cardiac embolism, as when the cyst is extruded whole into the ventricle and is too big to enter the aortic or pulmonary orifice. (d) Arterial embolism may lead to infarction, and, if the patient survives, possibly to the development of a hydatid aneurysm or periarterial hydatid nodules. (e) "Secondary metastatic echinococcosis" may occur, for instance, the development of secondary hydatid cysts in the lungs.

In our case the fatal termination was probably due to anaphylactic shock and to increase in intracranial blood pressure

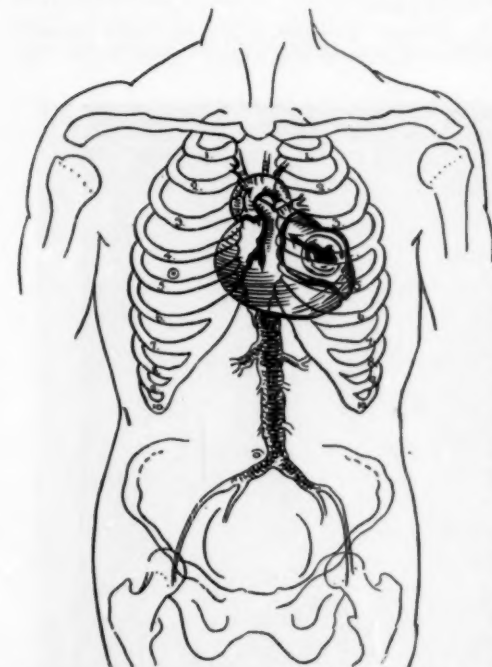


FIGURE III. Diagram to show location of cyst and its rupture into left ventricle and the blockage of the abdominal aorta.

through the blockage of the abdominal aorta. The onset of convulsions and of coma has been noted as a result of rupture of a hydatid cyst into the peritoneal cavity.

Another interesting fact pointed out by Dévé is that recurrent rupture of a hydatid cyst of the heart occurs in a considerable proportion of cases. The cyst may rupture first into the pericardial sac, which then becomes partly or completely obliterated by an adhesive pericarditis, and secondary pericardial cysts may be formed. Later the cyst may rupture again, but this time it must necessarily open into one of the chambers of the heart, as the outer wall of the cyst has now been reinforced by the adherent pericardium. In the case reported here the pericardium was completely adherent, but no secondary pericardial cysts were found. A previous leakage of fluid from the cyst might account for the absence of scolices from the extruded contents. On the other hand, there was slight scarring of the mitral valve which might have been produced by a former attack of rheumatic endocarditis. The question must remain a matter for conjecture, but it seems probable that the pericarditis was caused by an intrapericardial escape of hydatid fluid rather than by rheumatic fever.

Not many hydatid cysts of the heart have been recorded since Dévé collected those reported up to 1928. Heilmann, of Johannesburg, published a short report⁽²⁾ of a hydatid cyst in the interventricular septum which apparently gave rise to intermittent heart block. More recent cases were reported by Vara-Lopez⁽³⁾ and by W. J. Long, of Bendigo, Victoria.⁽⁴⁾ The latter was an interesting case, as it was the first hydatid cyst of the heart to be successfully treated by operation; it was diagnosed radiologically.

In our case, even if the diagnosis had been made during life, the location of the cyst on the posterior aspect of the heart would have made it inaccessible to surgical attack.

Summary.

A case is reported of the rupture of a hydatid cyst of the heart into the left ventricle, with hydatid embolism of the abdominal aorta and death within a few hours.

Acknowledgements.

We wish to thank Sir Louis Barnett for the loan of literature on hydatid cysts of the heart and for his helpful interest in this case. We are indebted to Dr. Foley, Medical Superintendent of Napier Hospital, for clinical notes and the skiagram of the chest.

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AN UNUSUAL SYNDROME FOLLOWING HEAD INJURY IN CHILDHOOD.

By P. STANLEY FOSTER AND W. H. BREMNER,
Christchurch Hospital, New Zealand.

INTRACEREBRAL hæmorrhage resulting from head injury receives but scant attention in surgical text-books and journals. The following three cases are published to draw attention to this condition, which may not be so uncommon as the paucity of literature would indicate.

CASE I.—The patient, J.H., a boy, aged six years, was admitted to hospital under the care of one of us (W.H.B.) on October 18, 1935, having fallen on his head on the asphalt playground at school the day previously.

On admission to hospital the child was stuporose and presented the picture of cerebral irritation. There were present spastic paralysis of the right arm, flaccid paralysis of the right leg, right facial paralysis and motor aphasia.

The pulse rate varied between 80 and 100 per minute during the first two or three weeks of the illness.

Until October 31, 1935, that is, thirteen days after the child's admission to hospital, his condition remained unchanged except for a slight return of the power of grip in the right hand. There was no papilledema. Lumbar puncture was carried out and normal cerebro-spinal fluid under slightly increased pressure was obtained. Radiographic examination of the skull showed no evidence of fracture.

On November 2, 1935, a left subtemporal exploration was undertaken. No extradural or subarachnoid hæmorrhage was found. There was no evidence of increased intracranial pressure. The brain appeared normal, there being no evidence of subcortical hæmatoma.

Following operation the paralysis and aphasia steadily improved, and on December 19, 1935, two months after the accident, the patient was discharged from hospital, apparently normal except for a slight facial paresis.

Six months later the child was at school and was normal in every respect on examination.

CASE II.—The patient, B.F., a girl, aged six years, was admitted to hospital under the care of one of us (W.H.B.) on September 5, 1936, with a history of having been knocked down by a car an hour prior to admission.

On admission she was stuporose, with flaccid paralysis of right arm and leg and right-sided facial paralysis. The left pupil was larger than the right.

The stupor and paralysis remained unchanged for ten days, during which period the pulse rate varied from 90 to 150 per minute. Radiographic examination showed a doubtful fissured fracture in the left occipital region. Neither lumbar puncture nor operation was performed.

On September 10, 1936, a purulent discharge appeared from the right ear. On September 18, 1936, thirteen days after the patient's admission to hospital, there was some movement of the right leg. Thereafter the paralysis steadily resolved, and on October 14, 1936, five weeks after her admission, the patient was discharged fully recovered.

Examination on July 1, 1937, ten months after the accident, showed the patient to be normal in every respect.

CASE III.—The patient, Betty T., aged eleven years, was admitted to hospital under the care of one of us (P.S.F.). She had been injured in a motor-bus accident. When seen twenty-four hours later she was unconscious, and had almost complete

hemiplegia, with left facial paresis and complete paralysis of the left arm and leg. This was said to have been present immediately after the accident. She was not deeply unconscious, and there were no signs of compression of the brain. She had vomited a good deal before admission.

On examination the patient showed general irritability and resented examination. The left arm was in a condition of flaccid paralysis, while the left leg was rather spastic. The plantar reflex was indefinite, and at no stage was there a definite Babinski sign. The left abdominal reflex was absent. The pupils were equal in size, reacting sluggishly to light. Incontinence of urine and faeces was present.

This condition of irritability persisted; at first the patient was unable to swallow, but after a few days she took fluids when spoon-fed. There was little or no improvement after three weeks, though the general condition caused no immediate anxiety.

At this stage operation was carried out, consisting of subtemporal exposure of the brain surface on the right side. There was no extradural clot, nor any sign of fracture. The dura was opened, but the brain surface was of normal appearance, with no bulging.

One week later recovery commenced in the arm and leg, and gradually became more pronounced. Speech returned slowly, and the mental condition took many weeks to approach normal.

Since then gradual recovery has taken place. The patient now gets about well and seems mentally bright and cheerful. Her left foot still shows signs of spasticity. The left hand at the present time lacks the finer movements of the fingers.

Comment.

These cases present several features in common:

1. The brain damage was present and maximal when the patients were first seen after the accident.
2. In all cases there was complete unilateral paralysis and in two cases aphasia.
3. Despite the widespread paralysis, in no case was there evidence of an overwhelming increase in intracranial pressure.
4. Two of the three patients were subjected to craniotomy, and no signs of extradural or subarachnoid hæmorrhage was found.

We consider it certain, in view of the clinical and operative findings, that these three children suffered from an intracranial hæmorrhage occurring in an area such as the internal capsule, where a maximum of paralysis could result from a minimum of hæmorrhage. The paralysis came on too early to be caused by post-traumatic œdema, even if œdema could cause such extensive paralysis, which is very doubtful. In the two patients operated upon there was no evidence whatever of any cerebral laceration. In both cases the brain appeared normal externally.

The complete recovery of the first two patients was very gratifying. The third and most recent case was much more severe, and recovery has been much slower. It is impossible to say yet whether complete recovery of the hand movements will occur.

ANKYLOSIS OF TEMPORO-MANDIBULAR JOINTS: CURE BY ESMARCH'S OPERATION.

By I. DOUGLAS MILLER,
Sydney.

THE patient, a female, aged twenty years, gave a history of having had, at the age of two years, bilateral discharging ears, which had been followed by total deafness and inability to articulate. Since this infection her lower jaw had been fixed in the closed position. She had an absent tooth in front, and through the gap she was in the habit of pushing soft food.

On examination, her nutrition was seen to be good. There was absolutely no mandibular movement. Radiographic examination showed some destruction of the articular surfaces of one temporo-mandibular joint, but no obvious changes were to be seen in the other. There was some maldevelopment of the body of the mandible (see Figure I). Under anæsthesia no suggestion of movement could be obtained.



FIGURE I. Skiagram showing shape of mandible.

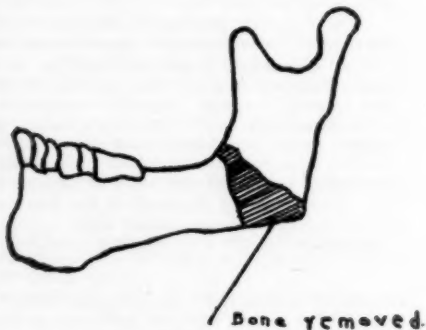


FIGURE II. Diagram showing extent of bone removed at operation.

Operation.

On the assumption that so many years of fixation would have resulted in a considerable degree of muscular contracture, I thought any operation on the temporo-mandibular joint or neck of the mandible would be ineffective. I therefore decided to do a modification of Esmarch's operation. A small incision was made on each side behind the angle of the mandible, and the masseter and internal pterygoid muscles were separated from the bone to their most anterior limits of attachment. When this had been done a fine periosteal elevator could be passed round under the soft tissues in front from one side of the mandible to the other. A wedge of bone, with a base about 2.5 centimetres (one inch) wide, including the angle of the mandible, was then nibbled away with bone forceps. This was much more simple than the usually described

method of cutting with a saw. On removal of the bone, the exposed masseter and internal pterygoid muscles were joined by a few sutures and the wound was closed. The jaw was well open.

Many irregularly grown teeth were removed on a later occasion.



FIGURE III. Skiagram three months after operation.



FIGURE IV. Photograph showing patient with mouth open.

The end-result of this operation, seen some months later, was satisfactory. The patient can open her mouth five centimetres (two inches), and has excellent and strong control of closure. There is no instability, and she is able to eat normal diet.

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NEOPLASM OF HORSESHOE KIDNEY.

By ARCHIE ASPINALL,
Sydney.

S.S., A MALE PATIENT, aged twenty-six years, an electrician working in the Postal Department, was referred to me by Dr. Solomon, of Wagga, New South Wales, on account of an abdominal tumour of obscure origin, but probably malignant.



FIGURE I. Showing tumour removed at operation.

Inquiry into the family history showed that the patient's father suffered from osteomyelitis, his brother had duodenal ulcer, and his mother suffers from hæmorrhage from the stomach.

For the last three months the patient had had attacks of diarrhœa alternating with constipation. Mucus was present in the stools, and they had an offensive odour. He had colicky pain in the lower part of the abdomen. Attacks occurred between 1 a.m. and 11 a.m. The patient had no trouble with micturition. He attributed the diarrhœa to the water in town upsetting him. Opaque meal and enema investigation prior to his coming to Sydney revealed no organic lesion of the small or large bowel. Cystoscopic

examination showed that both ureters were functioning normally; neither retrograde nor intravenous pyelography was done.

The specific gravity of the urine was 1030; it contained neither albumin nor sugar.

On examination, the patient was seen to be a healthy-looking young man. On palpation of the abdomen a rounded fixed mass could be felt deeply situated below the umbilicus in the mid-line; but it could not be clearly defined and could not be felt *per rectum*.

On the patient's admission to Sydney Hospital, attention was not directed to the genito-urinary system, but rather to the alimentary system. The urine was clear. Neither the Wassermann nor the Kahn test yielded a reaction. The blood count was normal. No occult blood was discovered in the stools. A barium meal and a barium enema failed to reveal any abnormality. The Casoni test yielded no reaction.



FIGURE II. Showing cut surface of tumour removed at operation.

Examination of the stools revealed no abnormality. The antrum was washed out and some pus was present in the washings. An X ray examination of the sinuses was made, and the antra were found to be dull.

A tentative diagnosis of retroperitoneal sarcoma was made.

On September 2, 1937, under ether anaesthesia, a left paramedial incision was made. The patient was placed in the Trendelenburg position. The tumour was found to be retroperitoneal, somewhat cystic on palpation and of dark grey colour.

The peritoneum was incised over the tumour, and the rounded tumour was freed in the lower portion, and then it was found to be growing from kidney tissue. Closer examination showed that the kidney was of the horseshoe variety, the major portion being on the left side; and two ureters passed in front of the kidney, fused, and entered a small pelvis just above the tumour. Very little kidney tissue separated the pelvis from the tumour. An attempt was made to aspirate the tumour, but it was found to be solid, although it felt quite cystic. Bleeding from the kidney was controlled by mattress sutures, and the tumour, which was completely encapsulated, was separated

from the kidney. The raw edges of the kidney were approximated with thick catgut sutures, tied firmly, but not tightly. Extraperitoneal fat was drawn over the line of suture and the peritoneum was overlapped and sutured over the site of the approximation of the two portions of the kidney. The abdominal wound was closed without drainage. There was slight hemorrhage into the bladder for twelve days after the operation; otherwise convalescence was uninterrupted.

Macroscopic examination of the specimen showed that it consisted of a cellular tumour with a smooth surface. It measured 9.3 centimetres in diameter. On section it seemed to consist of pultaceous-looking material.

Microscopic examination was made by Dr. C. H. Shearman, of the Kanematsu Memorial Institute of Pathology.

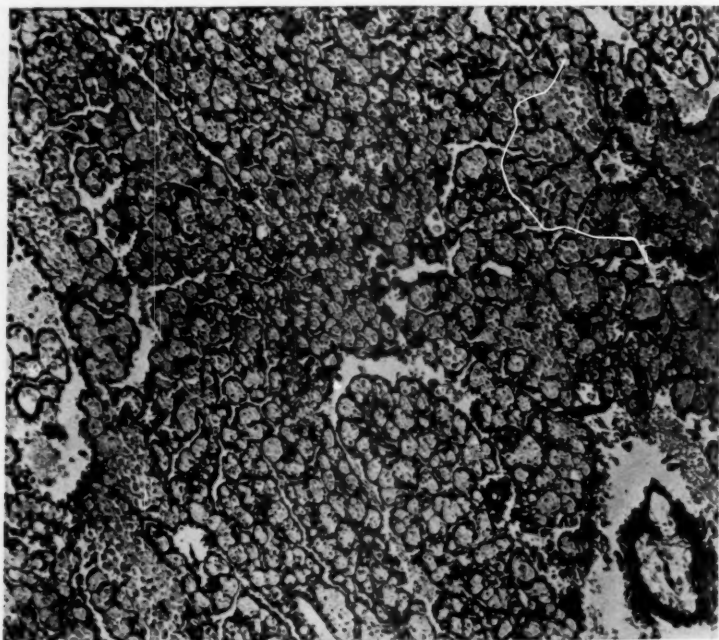


FIGURE III. Photomicrograph showing papillary adenocarcinoma.

The sections showed the structure of a papillary carcinoma. Large numbers of somewhat granular-looking cells were present, the exact nature of which was uncertain. They resembled somewhat degenerated "clear" cells seen in so-called hypernephroma; but Dr. Shearman reported that Professor Inglis was of the opinion that they were lipoid histiocytes and not degenerated cells of the neoplasm. The tumour was, in Dr. Shearman's opinion, almost certainly of renal origin and should be regarded as malignant. The grade of malignancy was difficult to assess; but, taking into account the capsulation of the tumour and its histological characters, Dr. Shearman thought that its malignancy appeared to be not of high grade.

Dr. Reginald Bridge, honorary urologist, made a "Uroselectan" investigation on September 23, 1937. The right kidney was apparently fused with the lower pole of the left, or it had undergone ptosis in a horizontal direction across the body of the fourth lumbar vertebra. The calyces showed definite dilatation and some delay in excretion. The left ureter could be made out, but the right was not visible.



FIGURE IV. Skiagram taken on October 19, 1937.



FIGURE V.

In March, 1938, the patient reported that he was back at work and feeling well. The case is of interest on account of the absence of genito-urinary symptoms, the completely encapsulated tumour, the double ureter apparently on the right side, with a normal ureter on the left. Further, it was possible to remove the tumour without damage to the kidney.



FIGURE VI.

Addendum.

On June 9, 1938, the patient reported that he experienced the same symptoms as last year, namely, diarrhoeal attacks during the early morning hours and slight pain in the epigastrium. On exercising he perspired freely on the back, particularly in the region of the kidneys. He had noticed blood stains on his underclothing, the stains being spattered. After careful observation, no further sign of blood in the passing of urine had been noticed. He felt perfectly well and his weight had increased by eight pounds.

On July 30, 1938, the patient was quite well. Cystoscopic examination was carried out by Dr. Reginald Bridge, who also performed bilateral retrograde pyelography. He reported that cystoscopy revealed no double ureter on either side. Bilateral retrograde pyelography revealed horseshoe kidney. The right pelvis was over the fourth lumbar vertebra, the ureter being presacral. The left portion of the kidney was in a normal position and showed very little distortion (see Figures V and VI).

The Australian and New Zealand Journal of Surgery.

All articles submitted for publication in this journal must be typewritten and double or treble spacing should be used. Each article should conclude with a brief summary and statement of conclusions. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without any abbreviation: initials of author, surname of author, full title of article, name of journal, volume, full date (month, day and year), number of the first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given, with full date in each instance.

When illustrations are required, good photographic prints on glossy gaslight paper should be submitted. Line drawings, charts, graphs and so forth should be drawn on thick white paper in indian ink. Authors who are not accustomed to prepare drawings of this kind, are invited to seek the advice of the Editor if they are in any doubt as to the correct procedure. Skiagrams can be reproduced satisfactorily only if good prints or negatives are available.

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MEDICAL SUPERINTENDENTS OF HOSPITALS.

UNDER the system at present in vogue the executive heads of hospitals are not adequately trained and equipped for their work. First a special type of man is required, and in addition a full course of suitable training must be provided for him if a successful administrator is desired. At the present time executive heads of hospitals may be divided into three classes. The first includes medical graduates who are permanently appointed to the position; there are, however, very few of these. The second class comprises business men. Those in this group and the permanent medical heads of the first group have as a rule very little knowledge of hospital needs when they first receive their appointments. In the third class are young medical graduates who hold the position for about three years, and who use it, more often than not, as a stepping stone to an honorary appointment on the hospital staff. Of these systems, that of having a permanent medical head is undoubtedly the best, and the appointment of a temporary medical head is frankly the worst.

A hospital is intended primarily and ultimately for the medical treatment of the sick; all its other services are subsidiary to this, its main, purpose. Only a medical man who has spent at least six years in acquiring his knowledge can guide a hospital efficiently, for he alone can have knowledge of the

medical side of the work for which the hospital was established. Only a medical man can by his training realize the relative value of the medical needs of an institution. Only a medical man can discuss on terms of equal understanding with his seniors and fellows, the members of the honorary staff, necessary progress and expansion. Only a medical man can supervise the work of the medical staff. Since the treatment of the sick is all important in the life of a hospital, and since none but a person trained in medicine can understand this treatment, it follows that the control of a hospital should not be entrusted to a layman who has not sufficient knowledge to give judgement on a medical problem, and who is apt to allow the side that he knows, the business side, to override the side that he does not know. Control of a hospital entrusted to a layman is like the navigation of a ship given into the hands of its purser.

The executive head of a hospital cannot be content to know one aspect of the problem only. In addition to knowing the medical side, he must be prepared to undergo a course of training in ancillary subjects, so that he will be able to control all the departments of the institution. This is a large order, but it is necessary. A medical man can acquire this knowledge; a layman cannot acquire the necessary medical knowledge.

A medical graduate who wishes to make hospital management his life's work must be prepared to spend some years serving an apprenticeship; at the same time he should be able to earn a living. During this period of training he would have to spend two to three years as assistant superintendent in a large hospital, where he would be given practical experience in all sides of the work. After a period of study he should be required to pass an examination in certain subjects at the hands of some authoritative body. These subjects would include hospital development, secretarial duties, the management of hospital finance and accounts, hospital reports, the handling of patients, medical records, staff organization and management, hospital purchasing and supplies, the purchase and keeping of equipment, hospital law and insurance, fire precautions and prevention, the organization of a dietary department, laundry management, convalescent homes, publicity and propaganda. In most of these subjects subsections would require special attention.

It may be objected that there is no demand for such highly trained medical executive officers. This is admitted; but the supply would create a demand. The boards of hospitals fortunate enough to have such an officer are satisfied that the service given by him is the best that can be obtained. To encourage men to undertake this kind of work the remuneration must be adequate. An assistant superintendent should receive a salary of £600 to £800 a year. The head of a hospital of 200 beds should receive £800 to £1,000. If the beds were 300 or over the salary should be from £1,200 to £2,000; and the head

of a large teaching hospital should receive from £2,000 to £3,000. Many positions could be made available. In New South Wales, for example, there are at least fifteen hospitals of 300 beds or over, and from fifteen to twenty hospitals of 100 to 200 beds.

If a scheme such as this were adopted it would be wise for those bodies in charge of hospitals in each State to subsidize certain of the large hospitals to act as training schools for permanent medical superintendents. In this way a proper supply of trained men would be available, and the present haphazard method of control by untrained men, medical and lay, would become a thing of the past. The larger outlay in salaries demanded by such a scheme would be more than offset by economy of management, to say nothing of increased efficiency.

R. B. WADE.

Surgery in Other Countries.

[In this column will be published short résumés of articles likely to be of practical value from Journals published in other countries and not readily accessible to surgeons in Australia and New Zealand.]

URETERAL TRANSPLANTATION INTO AN ARTIFICIAL BLADDER.

Leo Seiffert (Neunkirchen, Saar): "*Indikationen und Operationstechnik der 'Darm-Siphon-Blase', ihre Leistungsfähigkeit in Röntgenbild und Film*", *Zeitschrift für Urologie*, Volume xxxi, Number 1, 1937.

THE author reports a case in which he transplanted the ureters into an artificial bladder made from an isolated loop of jejunum and then performed total cystectomy. The technique is as follows:

The highest jejunal loop is chosen and emptied, and its vascular supply inspected by holding the spread-out mesentery against the light. A section of it about 30 to 35 centimetres long is selected, particular care being taken to see that it is supplied by a good big vessel, and that it can be well mobilized. The loop is then disconnected from the rest of the intestine (see Figure I). Incisions are made in the mesentery in such

a way that, as far as possible, the vessels which supply the bowel are spared. As a rule, it is only necessary to ligate a few unimportant anastomosing vessels. The jejunal loop now hangs by a pedicle and is drawn to the right side of the abdomen and covered with a towel. The continuity of the jejunum is next re-established.

The further steps of the operation take place in the lower portion of the abdomen. The urinary bladder is isolated (in the case reported the bladder was completely filled with papilloma), and the lower parts of both ureters are separated and divided between ligatures about four or five centimetres from the bladder wall. The greatest care is taken to spare the periureteral vessels.

As it is necessary to displace the left ureter to the right, so that both ureters can be implanted near one another in the oral end of the jejunal loop, it may be necessary, in order to prevent kinking of the left ureter, to free it to a rather higher level than on the right side. A canal is made by means of a half-open artery clamp towards the right side between the aorta and the mesenteric stem, and through this the end of the left ureter is



FIGURE I. The loop of jejunum with the mesenteric vessels, which is selected for isolation.

drawn. The ends of both ureters now lie near each other and are then sutured into the oral end of the jejunal loop, so that the terminal five to seven millimetres lie free in the lumen of the isolated loop. In order to minimize leakage through the suture holes, the wall of the ureter is sutured with a fine needle, and only a few sutures are used. As soon as the first fixed suture in the intestinal loop is inserted, the short ligated free end of the ureter is amputated, and the urine allowed to run into the new bladder. The ureters are now fixed into the oral end of the isolated loop by invaginating sutures, and finally they are sutured into a canal of intestinal serosa. The proximal sutured end of the loop with the ureters is now further strengthened by suturing of the peritoneal cut edges over the intestinal-ureteric junction. An attempt is now made to make some sort of closure apparatus in the distal end of the artificial bladder. About a hand's breadth below the umbilicus and to the right of the mid-line, a vertical incision is made, into which the distal end of the isolated jejunal loop is placed. By means of blunt-nosed forceps, a canal is made from this wound through the rectus muscle transversely from the right to the mid-line, and this canal is enlarged so that the free end of the artificial bladder can be brought out and temporarily closed with a tobacco-pouch suture. As it is drawn through the muscular canal it is given a twist of 360°, in order to attain partial closure. In order to avoid the formation of pockets in which the

intestine may become strangulated, the free cut edges of the mesentery are joined with a few sutures to the peritoneum of the anterior and posterior abdominal wall. The new bladder now hangs siphon-like in the right side of the abdomen and in the pelvis (see Figure II).

The tobacco-pouch suture, which was inserted in order temporarily to close the lower end of the isolated loop, is removed and the mucous membrane stitched to the skin. A fair-sized gum-elastic catheter is inserted into the opening thus made and connected to a tube which leads into a vessel.

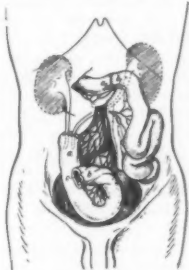


FIGURE II. The new intestinal-siphon-bladder and the reconstitution of the jejunum (a and b); c is the opening of the artificial bladder in the abdominal wall.



FIGURE III. The urinary act in full stream.

Some weeks later in the patient whose case is quoted, when the wounds had completely healed, a total cystectomy was performed. The patient recovered completely. The patient can remain continent for hours. Though it is not absolutely necessary, he wears a urinal for convenience, connected to the catheter, which can be closed with a tap, in the artificial bladder. When he wants to empty the bladder, he opens the tap and lets the urine run into the urinal. The patient can pass a good stream of water (see Figure III).

H. B. DEVINE.

THE TREATMENT OF PLEURO-PULMONARY SUPPURATION.

Dr. Lezius (Assistenzarzt, Universitäts-Klinik, Heidelberg): "*Behandlung der kombinierten Lungen-Brustfelleiterungen*", *Der Chirurg*, October 1, 1937.

HEALING of pleuro-pulmonary suppuration is achieved only by surgery. Operation is urgent in sudden menacing suppurations, but may be equally necessary in chronic cases. The choice of operation depends upon the condition of the patient.

When life is endangered, immediate aspiration of pus followed by suction drainage is required; later this should be followed by thoracotomy to deal with the primary cause of the trouble. In chronic cases the elimination of necrosed tissue and of thick-walled empyemata and fistulae is nearly as important as the evacuation of the pus.

Immediately following on the rupture of abscesses into the lung or pleura, the use of methods for the combating of shock and collapse is urgently necessary; of these methods the administration of caffeine, strophanthin, veritol or camphor by injection is usual. In the presence of severe toxic shock or acute circulatory failure, the intravenous infusion of isotonic saline or of 10% glucose solution, with small repeated transfusions, is most effective. It is necessary, however, to be guarded in the use of intravenous infusions in cases in which circulatory failure is associated with pressure changes in the mediastinum, and when a high intrathoracic pressure is present. In such cases venesection is better. Local analgesia is preferred if the operation is not to be extensive. In more extensive procedures "Avertin" is given as a basal anaesthetic before local anaesthesia is used. Early fears about the danger of the use of "Avertin" in toxic conditions are now disregarded in Heidelberg. The blood-saving

diathermy knife being very valuable in such cases, the inhalation anæsthetics are barred, while nitrous oxide has the disadvantage of raising the pressure.

The simplest and best method of treatment of an acute pyopneumothorax is a decompressing aspiration with a two-way syringe. Air and fluid are so quickly drawn off that pus is no longer forced into the lung, and symptoms are greatly relieved. If no real improvement follows this, the next procedure is the use of closed suction drainage in the hope that the patient may be made able to stand operation. Closed drainage, however, is not a satisfactory treatment in itself, owing to the presence of a communication between the lung and pleura. Open operation is necessary, moreover, for the removal of necrotic lung tissue and fibrinous masses, as well as for better drainage of fluids; and should not be unduly delayed in the treatment of a persistently febrile patient. In the absence of symptoms of toxæmia, operation can often well be delayed until the lung has expanded to come at least partially in contact with the chest wall. At the first opening of the chest, the swift emptying of the pus and the removal of necrotic tissue should be sufficient to avoid danger. Search for the fistulous opening and incision into abscesses are better left until adhesions have formed. In bilateral pyopneumothorax, thoracotomy has given better results than closed treatment. After one side is opened, a few days should be allowed to elapse for restoration of circulatory difficulties and adjustment to new pressure relations. During these days closed drainage or aspiration may be carried out on the second side, and all measures taken to prevent the collection of pus in lung tissue or pleural cavities.

The first consideration when operation is undertaken in cases of limited pleuropulmonary suppuration connected with a seat of infection in the lung, is to avoid the spreading of infection. This is not easy in the presence of interlobar abscesses which are difficult to locate. Abscesses are seldom found in the upper posterior part of the interlobar space. On the right side, between the upper and middle lobes, they are best approached in the third and fourth spaces in about the mid-axillary line. Their tendency as they develop is to follow the plane of the interlobar space towards the anterior wall, where they are met with in the fifth and sixth spaces between the anterior axillary and nipple lines. Left-sided collections usually lie between the third and eighth ribs, more posteriorly the more cranially they are situated. They should be carefully localized clinically and by X ray examination, and the spot should be marked on the chest wall before operation. Should it be necessary to await the formation of adhesions before the operation is performed, they can be hastened by extrapleural plombage with paraffin or vioform gauze, or the outer surface of the pleura may be painted with 25% trypanflavine. Operation is then generally possible in five to eight days. The pack is removed, the pus collection is aspirated, and the abscess is opened through a small incision in lung tissue. This is always a moment of danger. With the release of pressure a bronchial fistula may be opened up and pus be sucked into the bronchial system. The danger can be avoided if the incision is made under a positive intrapulmonary pressure of eight to ten centimetres of oxygen. The pus is sucked out and the wound is packed for a short time, the patient being allowed to cough up any pus that has entered the bronchi. Later a tube is inserted and tightly packed round with vioform gauze.

Pleural involvement by a subphrenic abscess can be attacked by the thoracic or the abdominal route and in one or two stages. At Heidelberg the transpleural-transdiaphragmatic route in one stage is preferred, provided the patient's condition is good enough and the preliminary localization has been sufficiently accurate. Posteriorly the ninth and tenth or anteriorly the fifth to seventh ribs are resected, and the diaphragmatic opening is sought by separation of the base of the lung. The diaphragm is then incised in the line of its fibres, and the subphrenic abscess is widely opened. The base of the lung is then dealt with, the opening into it is enlarged, and all available sites of infection are opened up by diathermy knife. All necrotic tissue is removed, and the lung wound is packed round a drainage tube. The opening in the diaphragm is sutured as well as possible; and the danger of the formation of a new broncho-subphrenic fistula is not great if the subphrenic space is well drained.

Putting aside such causes of chronic empyemata as those due to overlooked foreign bodies or misdiagnosed carcinomata, the commonest cause is thickening of the pleura, which may be so tough that only operative plastic measures will suffice. Next in frequency is faulty drainage, which must be made effective. Sometimes in chronic suppuration the lung tissue itself is changed into a dense hard mass, which must be removed for healing to occur. This is done by freeing the lung from the chest wall in several sittings and the subsequent application of a rubber or stout silk ligature round the hilus or between healthy and unhealthy lobes. The pleural

cavity is packed and left open. In other cases the infected lung is sewn into the chest wound and left to necrose, which it does in ten to fourteen days. The operation can be discontinued at any moment if the patient's condition demands it.

The closure of a chronic empyema complicated by a lung fistula depends on the size of the cavity, which should be determined by stereoscopic films, with contrast filling. It is most important to have all pus pockets eliminated and the infection abolished as soon as possible. The next most important aspect of the operation is the removal of the bony chest wall and pleural layer, and the covering in of the fistula opening by a muscle flap. The first ten ribs must be resected, particularly the first rib. This may be done in two stages, the first to the sixth ribs in the first stage, and the remainder, with the thickened pleura, at the second. Resection posteriorly right to the transverse process is essential to success, and if the mediastinum is involved the transverse processes also must be removed. After removal of the second lot of ribs and the pleura, a flap from the *erector spinae* group of muscles is fixed down on the fistulous opening, and it is astonishing to see how well such flaps will heal.

The elimination of small residual empyemata does not need so extensive a resection if the cavity can be levelled out and all angles and pockets reached through a smaller incision. The incision, however, should always be planned with the possible need of extensive rib resection and the possible necessity for muscle flaps in mind. Rib resection must always exceed the abscess area by some centimetres, and care must be taken to carry it sufficiently in a posterior direction. With regard to decortication, the principle is sound, but Kirschner achieves the same effect by latticed incisions through the pleura to the lung.

In after-treatment, operative shock is best treated by blood transfusion, pain and cough by opiates. Troubles in later healing are generally due to old or fresh pus formations in the infected tissues. The whole wound must, if necessary, be ruthlessly opened up. On the occurrence of any unexplained fever, an X ray film should be taken while the patient is in bed. At Heidelberg great weight is also attached to post-operative short-wave therapy, the patient being treated in this way every day from the first dressing change (fifth to seventh days) for four weeks, the dose ranging from ten minutes at first to fifteen minutes by the tenth sitting. This is at once discontinued on any sign of bleeding.

ARTHUR E. BROWN.

ARTHRODESIS OF THE SHOULDER.

J. Leveuf and P. Bertrand: "Un nouveau procédé d'arthrodèse de l'épaule: l'enchevîtement-butée au moyen d'un greffon tibia" (A new procedure for arthrodesis of the shoulder: the buttress peg by means of a tibial graft), *Journal de Chirurgie*, Number 5, November, 1937, page 593.

THE ideal of osseous fusion of the articular surfaces following an operation for arthrodesis is not always obtained (twenty-one cases of osseous ankylosis following thirty-four arthrodeses in Rocher's statistics). New techniques are often published, and the multiplicity of these attempts proves the imperfection of the methods employed. The production of an ankylosis is controlled by two principal factors, namely, fusion of the articular surfaces, which is difficult to obtain in children, and the difficulty in ensuring perfect immobilization after operation. In regard to the latter factor, the degree of abduction after operation sometimes gradually lessens to almost nothing, even when ankylosis seems complete; hence the necessity for some form of buttress, as well as the arthrodesis. Various authors have proposed different artifices to avoid this. Vulpius used metal nails; Gill, Schulz, Scagliette and others recommended, after the arthrodesis, fixation of the hinged acromion into a groove or flap cut into the humerus, but this fusion of the acromion is also difficult to obtain.

The present authors describe such a failure in a girl, aged ten years, with obstetrical paralysis of the right shoulder, in which, despite intra-articular arthrodesis and the fixation of the acromion hinge flap onto the upper end of the humerus, at the end of one year the acromion process had not united to the humerus. After this experience they have always completed the arthrodesis by a tibial graft (Figure 1). Albee placed the graft through the tip of the acromion into the humeral head, but the mechanical effect is precarious. Others have driven the graft, after the arthrodesis, centrally into the glenoid, but the hold of the graft in the thin glenoid may be insufficient. The principle of the author's operation is the placing of a very long tibial graft into the superior border of the glenoid and head of the humerus, with, however, the greater part of the graft lying under the whole length of the inferior surface of the acromion process.

It thereby acts not only as a graft, but as a block to adduction (which is the essential point), and also to antero-posterior and rotation movements of the humerus.

The operative technique is as follows. The patient lies prone, with the head supported over the end of the table and the shoulder and arm lying over the side. The leg is flexed and a 12.5 centimetre (five-inch) graft removed from the strong tibial crest. An incision is made along the acromion edge to the external aspect of the shoulder. The usual arthrodesis by intra-articular decortication is performed. The graft is then inserted. The inferior surface of the acromion is rugined of muscles. It should be noted that in Figure I

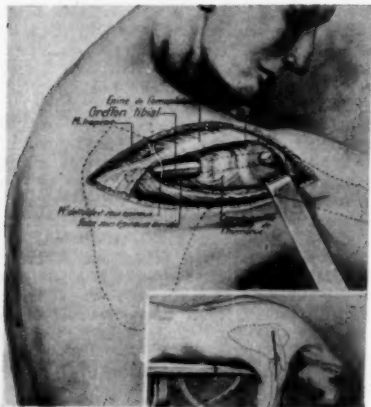


FIGURE I.

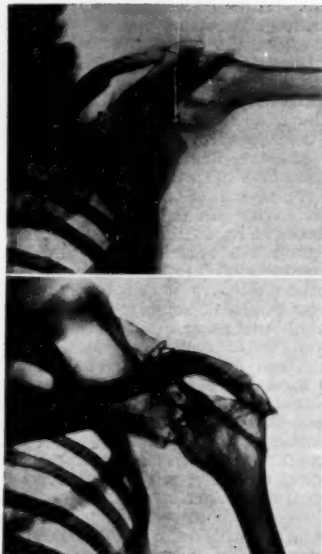


FIGURE II.

the inner third of the graft is held in place by burrowing under the inner attachments of the deltoid and infraspinatus muscles to the acromion. The bone is roughened. The arm is placed in 80° abduction, 20° to 30° ante-position and 45° internal rotation. By drilling with an awl, a tunnel is cut through the external surface of the humeral head and the superior border of the glenoid in a direction pointing beneath the acromion. The cortical bone below the great tuberosity of the humerus should be engaged by the graft tunnel, because it is more solid than the soft bone of the tuberosity, especially in old cases of paralysis where there is bony atrophy. Note in Figure II (a case of old infantile paralysis) how far distal to the great tuberosity the graft has been placed. This point is important. In this case the tip of the acromion was also sutured to the humerus. The graft is held firmly under the acromion by rustless wire or chromicized catgut. The arm is provisionally held in abduction by a bandage and the abduction plaster cast is not applied until two days or so later, when this procedure is easier because the patient can now sit up. The cast is not removed for six months. Six cases are described. In two cases, in order to consolidate a fibrous ankylosis, the graft alone was used. One of these was a case of tuberculous arthritis and deltoid paralysis, while in the other a decortication arthrodesis had previously been performed without benefit.

THOMAS KING.

CLINICAL PRINCIPLES AND TECHNIQUE OF ELECTRO-RESECTION.

Dr. Med. Werner Forssmann (Berlin): "*Klinik und Technik der Elektroresektion*", *Zeitschrift für Urologie*, 1937, page 153.

THE objects of electro-resection are the elimination of barriers to the free outlet of urine from the bladder caused by pathological changes in the tissues situated at the

bladder neck. Primarily this means the prostate, the changes being atrophy, hypertrophy, newgrowths and inflammations of the gland, and occasionally spasm of the musculature or papillomata of the bladder orifice. The narrowness of the urethral method of approach has hitherto imposed on the surgeon some hesitation and a very strict selection of patients, for with endovesical apparatus it is possible to deal only with those obstructions which are so placed as to be made clearly visible with the available apparatus. To do otherwise is too dangerous. Thus all those enlargements of the prostate whose development is down into the urethra are barred, and they, together with the subvesical, as distinct from the intravesical and mixed, forms are more suitable for prostatectomy, or, failing that, permanent aspiratory relief. Not only lack of good vision, but the position of the bands of sphincteric muscle in these cases forbids the use of endovesical resection. In those cases, however, in which the gland has extruded up through the sphincter ring, it has already widely separated the sphincter, it is freely visible and is entirely suitable for endovesical attack. Its pathological effect is produced by the elongation and anteflexion of the "prostatic urethra" and the consequent valve effect when the bladder is full. The subvesical type of enlargement, however, acts by direct pressure on the urethral lumen, and therefore cannot be cured as the other can, by removal of a small offending portion. Put in other words: if the surgeon sees a nearly normal bladder neck, with a good view of the trigone and ureteric orifices, he may take it that the removal of isolated portions of the prostate will be ineffective. But if cystoscopy reveals projections and protuberances which limit the field of vision, the chances of getting a good functional outlet by a partial removal are good. With a small prostate and a localized obstruction, even in a patient in good general condition, the operation of prostatectomy may well be supplanted by the less severe procedure of electro-resection. But the larger the gland, the more trouble there is going to be with the portion left behind; though some large glands may be attacked if the general condition of the patient makes prostatectomy unduly risky.

Notwithstanding this, all patients for electro-resection must be as fully investigated and as carefully prepared as they would be for prostatectomy. General, apart from urinary, contraindications are few; while of the local contraindications, bladder stone and the presence of a diverticulum are important. Infections must be minimized by all pre-operative measures possible, and a mild antiseptic run into the bladder a few hours before operation.

The operation is done under spinal anaesthesia. The modern type of resectoscope, such as that put out by Georg Wolff, has many points of advance over the earlier models. Two of these are the use of the shaft of the instrument itself as the inactive electrode and a much improved cooling system. The latter, known as the Usadel irrigation principle, allows for easy emptying and refilling of the bladder, and for the clearing of blockages without removal of the instrument. Frequent emptying and refilling of the bladder are important, as both Kretschmer and, later, Schlagentweit have drawn attention to the danger of a collection of explosive gas forming in the bladder as a result of electrolysis in a long drawn-out operation.

The resection may be accomplished either by an upward stroke towards the bladder cavity or by a downward stroke towards the urethra. The former is mainly used when it is necessary to clear away small remaining tags, and when it is necessary to limit the operation field sharply at the verumontanum, where the danger zone of damage to the sphincter muscle lies. Incontinence may follow on too free a resection in this area, if the sphincter muscle fibres are divided. Resection is always begun with a mid-line furrow which is enlarged to right and left before being deepened uniformly. So long as the lowest portion of the bladder is brought into direct communication with the lower part of the urethra, the object of the operation is achieved, and more is not necessary. The actual resection technique must be exact. The instrument must not only lie in contact with the gland surface, but must be pressed firmly against it, so that gland tissue may bulge well into the groove in the instrument in which the cutting loop glides. The left hand does not merely support the outer end of the instrument, but maintains a steady pressure and controls the position of the loop and optical apparatus. The position of the instrument varies during the operation, the handle being depressed at the start and gradually raised as resection proceeds, till at the end it may be pressed well up against the pubic arch. Sight and touch are both important in the proper carrying out of the operation. But "cutting under direct vision" is claimed in a misleading way by the makers of the instrument, and cannot actually be attained. It is only possible when there are no particles of tissue close against the optical apparatus, and this does not obtain during the actual cutting. The fragments removed generally

It thereby acts not only as a graft, but as a block to adduction (which is the essential point), and also to antero-posterior and rotation movements of the humerus.

The operative technique is as follows. The patient lies prone, with the head supported over the end of the table and the shoulder and arm lying over the side. The leg is flexed and a 12.5 centimetre (five-inch) graft removed from the strong tibial crest. An incision is made along the acromion edge to the external aspect of the shoulder. The usual arthrodesis by intra-articular decortication is performed. The graft is then inserted. The inferior surface of the acromion is rugined of muscles. It should be noted that in Figure I

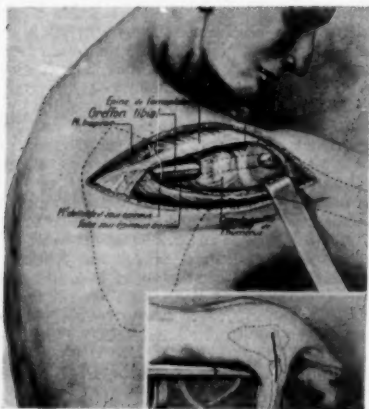


FIGURE I.

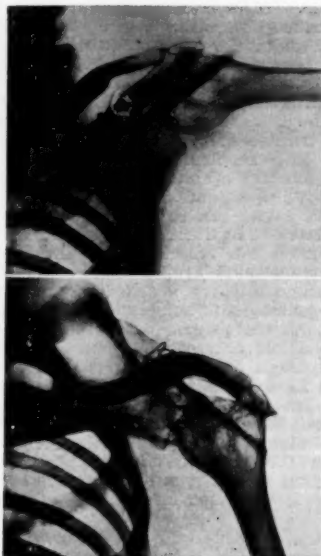


FIGURE II.

the inner third of the graft is held in place by burrowing under the inner attachments of the deltoid and infraspinatus muscles to the acromion. The bone is roughened. The arm is placed in 80° abduction, 20° to 30° anteposition and 45° internal rotation. By drilling with an awl, a tunnel is cut through the external surface of the humeral head and the superior border of the glenoid in a direction pointing beneath the acromion. The cortical bone below the great tuberosity of the humerus should be engaged by the graft tunnel, because it is more solid than the soft bone of the tuberosity, especially in old cases of paralysis where there is bony atrophy. Note in Figure II (a case of old infantile paralysis) how far distal to the great tuberosity the graft has been placed. This point is important. In this case the tip of the acromion was also sutured to the humerus. The graft is held firmly under the acromion by rustless wire or chromicized catgut. The arm is provisionally held in abduction by a bandage and the abduction plaster cast is not applied until two days or so later, when this procedure is easier because the patient can now sit up. The cast is not removed for six months. Six cases are described. In two cases, in order to consolidate a fibrous ankylosis, the graft alone was used. One of these was a case of tuberculous arthritis and deltoid paralysis, while in the other a decortication arthrodesis had previously been performed without benefit.

THOMAS KING.

CLINICAL PRINCIPLES AND TECHNIQUE OF ELECTRO-RESECTION.

Dr. Med. Werner Forssmann (Berlin): "*Klinik und Technik der Elektroresektion*", *Zeitschrift für Urologie*, 1937, page 153.

THE objects of electro-resection are the elimination of barriers to the free outlet of urine from the bladder caused by pathological changes in the tissues situated at the

bladder neck. Primarily this means the prostate, the changes being atrophy, hypertrophy, newgrowths and inflammations of the gland, and occasionally spasm of the musculature or papillomata of the bladder orifice. The narrowness of the urethral method of approach has hitherto imposed on the surgeon some hesitation and a very strict selection of patients, for with endovesical apparatus it is possible to deal only with those obstructions which are so placed as to be made clearly visible with the available apparatus. To do otherwise is too dangerous. Thus all those enlargements of the prostate whose development is down into the urethra are barred, and they, together with the subvesical, as distinct from the intravesical and mixed, forms are more suitable for prostatectomy, or, failing that, permanent aspiratory relief. Not only lack of good vision, but the position of the bands of sphincteric muscle in these cases forbids the use of endovesical resection. In those cases, however, in which the gland has extruded up through the sphincter ring, it has already widely separated the sphincter, it is freely visible and is entirely suitable for endovesical attack. Its pathological effect is produced by the elongation and antelexion of the "prostatic urethra" and the consequent valve effect when the bladder is full. The subvesical type of enlargement, however, acts by direct pressure on the urethral lumen, and therefore cannot be cured as the other can, by removal of a small offending portion. Put in other words: if the surgeon sees a nearly normal bladder neck, with a good view of the trigone and ureteric orifices, he may take it that the removal of isolated portions of the prostate will be ineffective. But if cystoscopy reveals projections and protuberances which limit the field of vision, the chances of getting a good functional outlet by a partial removal are good. With a small prostate and a localized obstruction, even in a patient in good general condition, the operation of prostatectomy may well be supplanted by the less severe procedure of electro-resection. But the larger the gland, the more trouble there is going to be with the portion left behind; though some large glands may be attacked if the general condition of the patient makes prostatectomy unduly risky.

Notwithstanding this, all patients for electro-resection must be as fully investigated and as carefully prepared as they would be for prostatectomy. General, apart from urinary, contraindications are few; while of the local contraindications, bladder stone and the presence of a diverticulum are important. Infections must be minimized by all pre-operative measures possible, and a mild antiseptic run into the bladder a few hours before operation.

The operation is done under spinal anaesthesia. The modern type of resectoscope, such as that put out by Georg Wolff, has many points of advance over the earlier models. Two of these are the use of the shaft of the instrument itself as the inactive electrode and a much improved cooling system. The latter, known as the Usadel irrigation principle, allows for easy emptying and refilling of the bladder, and for the clearing of blockages without removal of the instrument. Frequent emptying and refilling of the bladder are important, as both Kretschmer and, later, Schlagentweit have drawn attention to the danger of a collection of explosive gas forming in the bladder as a result of electrolysis in a long drawn-out operation.

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adhere to the loop and are easily removed with it. Any that remain are easily evacuated after the operation. For the sake of clean resection, as well as having regard to the life of the loop, it must be kept always absolutely clean for each fresh stroke, and the cooling current must be kept constantly going for the same reason. The amount of tissue removed and the length of each sitting are decided in accordance with the anatomical conditions present. The only general principle to be laid down is that enough gland substance must be removed to ensure a free urinary outflow, whether this is done in one or in several sittings. After each sitting the bladder is washed out and emptied, and any bleeding points are coagulated. Then 50 cubic centimetres of "Targesin"¹ solution are run in and left in. Further after-treatment is on the same lines as pre-operative treatment.

The effect of the resection is not always apparent immediately, being obscured by swelling of the bladder outlet. Retention may occur in the first few days, and this in the presence of open lymphatic spaces may give rise to severe infection, which is a danger. Immediately after the operation an indwelling catheter is put in and the bladder filled for an hour and a half with "Targesin". Use is made of the antiseptic action of the "Targesin", and it is considered wise to keep the bladder pressure raised for this time in order to help to control oozing. The catheter is left in until the urine is free from blood, until the urine output is good and the temperature normal. If any slightest rise in temperature occurs after its removal, or if the residual urine is more than 100 cubic centimetres, the catheter is immediately replaced. Copious water intake is insisted on, by mouth or by continuous infusion, the object being the passage of three litres of urine daily.

The post-operative dangers are bleeding, pulmonary embolism and sepsis. Immediate bleeding is best controlled by firm extension of the resection beyond the bleeding point. This will stop even spouting vessels. If it does not, there must be another cause for the bleeding, beyond the reach of endovesical treatment. In two of Forssmann's cases suprapubic prostatectomy with blood transfusion had to be done, both times successfully. Secondary hæmorrhages are generally slight, though in one case a prostatectomy had to be performed. Pulmonary embolism is rare. The main cause of death is pyelonephritis.

The total number of deaths among 86 patients treated in three years was nine, and as the series included many cases in which prostatectomy would not be attempted, the rate is not considered high; the mortality rate is diminishing among the later cases, with more experience. The functional result is good. Of the 77 living patients 63.9% have completely restored function, with residual urine under 50 cubic centimetres; 22.9% have a moderately good result, with residual urine up to 100 cubic centimetres; and 15.2% have residual urine of more than 150 cubic centimetres, these being cases in which the prostatic hypertrophy was complicated by bladder atony, renal insufficiency or vascular disease.

Electro-resection is not the simple, harmless procedure it has sometimes been claimed to be; but on the whole one should feel thankful that such a method exists for the treatment of difficult prostatic conditions. It must not be undertaken lightly, and should never be considered as out-patient work. Comparisons with prostatectomy are not properly justified, the two operations being complementary to each other, and each valuable in differing types of cases.

ARTHUR E. BROWN.

HYDATID DISEASE IN URUGUAY.

Professor Velarde Perez Fontana (Monte Video): *Archivos Internacionales de la Hidatidosis*, Volume iii, December, 1937, Fasciculus ii.

THIS is an elaborate study, in Spanish, recorded with meticulous care, of the various factors which may have any bearing on the alarming prevalence of hydatid disease in Uruguay and of the excellent scheme of preventive measures for which Dr. Fontana himself is largely responsible, and which have now been adopted by his government.

From a wealth of instructive information, all methodically set out, the following items are selected as being of special interest.

Geographical.—Uruguay is 187,000 square kilometres in area, and this is quite large as compared with many European countries, but small compared to the neigh-

¹ "Targesin" is a water-soluble diacetyl tannin silver protein combination on the market in Germany by Gödecke and Company of Berlin.

bouring republics of Argentina (three million square kilometres) and Brazil (eight and a half million).

The Population.—The population is approximately two and a quarter million. This represents twelve per square kilometre and indicates that Uruguay is the most densely populated country in South America.

Number of Sheep.—In Uruguay there are 11 sheep per head of population, as compared with 20 per head of population in New Zealand.

Number of Dogs.—The approximate proportion of dogs in Uruguay is one to every eight people, as compared with one to eleven in New Zealand. Steps are now being taken to reduce the number of dogs in Uruguay.

Prevalence of Hydatid Disease in Human Beings.—Approximately 450 new cases of hydatid infection are recorded every year in Uruguay. This is more than three times greater than the human incidence in New Zealand. Compulsory notification of hydatid disease in human beings was instituted in Uruguay in 1935. Rigid observance of this law must be maintained by the doctors and by the Health Department if it is to serve a useful purpose. New Zealand's experience with compulsory notification has not been encouraging.

L. E. BARNETT.

THE RADIOLOGICAL DIAGNOSIS OF INTRATHORACIC TUMOURS AND CYSTS.

Dr. Oscar Ivanissevich and Dr. Roberto Ferrari (University of Buenos Aires): *Boletín del Instituto de Clínica Quirúrgica*, March-April, 1938, page 273.

THE authors deal briefly with radiological diagnosis of intrathoracic tumours and cysts, and stress the importance, from the viewpoint of surgical approach, of a knowledge of whether the pathological lesion in question is located in the parietes or in one of the contained viscera. Artificial pneumothorax (Forlanini) may be of great assistance in the location of costal, sternal, vertebral, pleural, diaphragmatic, thyroid and aneurysmal lesions.

When a cyst is present in the lung the pneumothorax displaces the X ray shadow downwards. There is always a position in which a parietal tumour shows most of its shadow outside the lung; when the diaphragm is involved the induction of pneumoperitoneum may be useful.

Lipiodol injection may reveal a bronchial blockage in cancer of the lung. Stereoscopic radiography and tomography may also be employed with advantage when difficulties of localization are present. The article is illustrated with many excellent photographs.

L. E. BARNETT.

F. Dévé (Rouen): "*La signe radiologique de la calotte aeriennne n'est pas rigoureusement pathognomique du kyste hydatique du poumon*", *La semana médica*, Number 20, 1938.

DÉVÉ gives the name "*calotte aeriennne*" to a crescentic ribbon-like halo of comparative clearness sometimes seen in a radiogram along the upper margin of a pulmonary hydatid cyst shadow. This peculiar appearance, which has been noted from time to time during the last few years by German, Argentinian and French observers, and variously named and interpreted, has always been regarded as pathognomonic of a pulmonary hydatid cyst. Dévé, however, describes and figures one case, perhaps the exception which proves the rule, in which the "*calotte aeriennne*" was clearly visible in a series of X ray films repeated at intervals for several years, although there was no clinical or laboratory evidence of hydatid infection. A diagnosis of benign tumour was made. Ultimately fatal complications occurred and an autopsy revealed a bronchiectatic cavity tightly filled with a felted mass of aspergillus mycelium.

L. E. BARNETT.

HYDATID CYSTS OF THE PANCREAS.

Albert Ouvry: "*Contribution à l'étude des kystes hydatiques du pancreas*", *Thèse de Paris*, 1938.

THE author, whose monograph has been inspired by his chief, Professor F. Dévé, of Rouen, has based his study on the following material:

1. Three hitherto unpublished cases. One is that of a patient observed by him in the clinic of Professor Dévé and operated on by J. Pelit in February, 1936; the

second case occurred in the practice of J. Bertrand and A. Derocque in February, 1938, and the third in the practice of Biancardini, April, 1935.

2. The thesis of Miloche S. Doitchinovich, of Lyons, "*Les kystes hydatiques du pancreas*". This thesis was published in 1936; it consists of 207 pages and deals with 55 cases.

3. A series of 44 cases collected elsewhere in the literature.

The main points emerging from this study are:

1. The occurrence of hydatid cysts in the pancreas is rare, being less than 0.3% of all hydatid cysts.

2. The cysts recorded have always been primary, have always been single, and only rarely have there been concomitant cysts elsewhere, for example, in liver, lung or spleen.

3. The clinical features vary according to location: (a) In the head of the pancreas. This is the most frequent site, two-thirds of the cases recorded being found in this part of the organ. They are usually associated with biliary colic and jaundice and consequently are often confused with gall-stones or cancer. (b) In the middle and (c) in the tail of the pancreas. Here the clinical features depend on the anatomical environment; and it may be hard to decide whether the cyst is in the left lobe of the liver, in the left kidney, the spleen or the mesentery.

4. Diagnostic points of special value are: anaphylactic signs, such as urticaria; marked resistance as compared with the flaccidity of other pancreatic cysts; fixity; the findings on X ray examination and the results of laboratory tests.

5. The usual surgical treatment is marsupialization. In particularly favourable circumstances closure without drainage is possible. Resection of the cyst with the adventitia should never be attempted.

6. The chief post-operative complication is a chronic pancreatic fistula, and the treatment suggested is antidiabetic regimen *plus* alkalis and belladonna. In very stubborn cases surgical implantation of the fistula into a neighbouring digestive channel might be considered.

L. E. BARNETT.

MYXØDEMA FOLLOWING REMOVAL OF A LINGUAL GOITRE.

P. Sainton, G. Ardoin and P. Frankfurt: "Myxœdema Following the Ablation of a Lingual Goitre", *Bulletins et mémoires de la Société médicale des hôpitaux de Paris*, Volume lili, March 19, 1937, page 31.

A FOURTEEN-YEAR-OLD GIRL gave a history typical of myxœdema. She had somatic signs and an increase of weight of 20 kilograms. She was apathetic and all her intellectual functions had deteriorated.

At first sight the myxœdema seemed to be spontaneous. It was found, however, that an operation had been performed two years previously for a tumour at the base of the tongue, and that this tumour had been a lingual goitre. Treatment with thyroid extract not having been successful, the patient was submitted to thyroxine treatment, and a physical and mental improvement was obtained.

Cases of myxœdema, following the ablation of lingual goitre, are known, but are rather unusual. The authors quote some of them, and stress the danger of interference with a lingual goitre. Some grafting experiments, after ablation of the ectopic thyroid tumour, have been attempted.

P. MOULONGUET.

Analysis from *Journal de Chirurgie*, Volume 1, September, 1937, page 367.

SURGERY OF NEUROMATA OF THE MEDIASTINUM.

Cernoovic (Brünn): "Contribution to the Surgery of Neuromas of the Mediastinum", *Zentralblatt für Chirurgie*, Volume lxiiv, January 30, 1937, page 251.

SINCE tumours of the mediastinum of nervous origin have become better known, it has been shown that they are relatively frequent. In 1926 Redlich was able to gather records of only 14 cases. In 1934 Makkas found 28 case records, and in 1935 the American statistics of Sophian record about 97 cases. Harrington, of the Mayo Clinic, reports 14 cases.

These tumours are seen chiefly in young people and mostly in women. Their invariable position is in the costo-vertebral gutter, behind the pleura, more often to

the left than to the right. (Cysts always occupy the anterior mediastinum.) Diagnosis is made by radiography, which shows in this region a rounded or oval shadow of regular contour.

Histologically, the question is whether the tumours are ganglioneuromata arising from the sympathetic system or neurofibromata originating in either the pneumogastric, the intercostal nerves or the brachial plexus. Malignant degeneration is more frequent in the last mentioned, and is unusual in the ganglioneuromata. Primitive neurosarcomata are rare.

Cernoovic's observation concerns an angiofibroma noticed in a man, aged twenty-eight years. The patient complained of interscapular pain and fits of coughing. Examination revealed a faint interscapulo-vertebral prominence and a homogeneous shadow, situated behind and to the left of the upper opening of the thorax, and forcing the trachea and oesophagus to the right. The tumour was reached by resection of the third to the fifth ribs in lengths of eight centimetres. It was as big as two hands and smooth; it was without adhesion and its enucleation was easy. Nevertheless, the pleura was opened and sutured immediately. Recovery was without further incident except for the occurrence of a serosanguineous pleural effusion, which was aspirated. The removed tumour weighed 370 grammes.

CH. LENORMANT.

Analysis from *Journal de Chirurgie*, Volume 1, September, 1937, page 373.

FIBROMA OF THE STOMACH.

Pfaff (Offenbourg): "A Case of Pure Fibroma of the Stomach", *Zentralblatt für Chirurgie*, Volume lxiv, February 13, 1937, pages 407-409.

To the rare cases of fibroma of the stomach already published (Anschutz and Konjetzny have been able to gather only seven), Pfaff adds a new observation, of which the following is a summary:

A woman, aged forty-one years, for a period of six or seven months complained of nausea and vomiting and of radiating pains in the back for several weeks; she had anorexia in relation to meat. Examination revealed tenderness in a limited area to the left of the umbilicus. Anacidity and blood were discovered in the motions. Radiological examination revealed an irregular contour in the prepyloric region and delay in gastric evacuation. At operation a tumour the size of a small apple was found deeply implanted in the pyloric wall. On the prominence of the tumour, where it projected into the lumen of the stomach, the mucous membrane was ulcerated. There were inflamed glands in the vicinity. Posterior gastro-enterostomy and resection of the pylorus were performed. Histological examination showed the tumour to be a soft oedematous fibroma. The patient recovered and was well eighteen months later.

CH. LENORMANT.

Analysis from *Journal de Chirurgie*, Volume 1, September, 1937, page 382.

Reviews.

MEDICAL ESSAYS.

Medical Essays. By J. C. MEAKINS, M.D., F.R.C.P.; 1937. Australia: Angus and Robertson Limited. Demy 8vo, pp. 188, with 18 illustrations. Price: 10s. 6d. net.

"MEDICAL ESSAYS", by Jonathon Meakins, represents the substance of a series of addresses delivered under the auspices of the New South Wales Post-Graduate Committee in Medicine. The "Sir Charles Clubbe Memorial Oration", 1937, is also included in the volume.

The author has the advantage of being not only a physician, but also the professorial head of a large university medical unit, so that his laboratory investigations are combined with their clinical applications. Simplicity of classification and lucidity in expounding physiological and biochemical principles are common to all the addresses.

Several old ideas are discussed and some new ones presented, the reader thus being given cause for thought, even if he cannot accept them all.

The first two addresses concern circulatory failure. Emphasis is placed on the importance of the peripheral segment of the circulation in its maintenance. The subject is discussed from the varying viewpoints of physiology, biochemistry and pathology, whilst the subject of peripheral circulatory failure in shock, peritonitis, pneumonia and hæmorrhage is considered in some detail.

The third and fourth addresses are concerned with respiratory failure. The two main functions of respiration, namely, the external and the internal, are considered under normal conditions and then under conditions of disease. An excellent table is given showing the causes of dyspnoea, followed by an interesting dissertation on this symptom.

The anæmias are considered under the simple classification of hypochromic and hyperchromic, their ætiology and treatment are dealt with, and the use and misuse of iron are discussed.

In the address entitled "Blood Chemistry in Renal Lesions", the belief is expressed that only one form of nephritis or hæmorrhagic Bright's disease exists, which passes through different phases in its life history. Doubt is expressed that nephrosis occurs as a separate clinical entity, it being thought to be a phase in the life history of nephritis.

The last address is an excellent dissertation on the subject of growth. In this address the author discusses the part played by food, hormones, ductless glands and living conditions in the growth of the human body.

This book will be found most useful by every medical practitioner.

ELEMENTARY DIAGNOSIS FOR STUDENTS.

Workbook in Elementary Diagnosis for Teaching Clinical History Recording and Physical Diagnosis. By L. CLENDENING; 1938. St. Louis: The C. V. Mosby Company. Melbourne: W. Ramsay (Surgical) Proprietary Limited. Demy 4to, pp. 167, with illustrations. Price: 18s. net.

THIS book has the declared intention of teaching the student how to take a clinical history and make an examination of the patient. With that view in the author's mind, the text is well set out. It certainly enumerates the various points to be elicited from the patient, and what to look for when conducting the examination. It would seem, however, that all this can be better demonstrated to the student by actual bedside clinics than if he reads it from a book of this description. It would appear that the author has attempted too wide a scope in this book, in that he has tried to combine both medicine and surgery, to the detriment of the latter.

Stress is laid on the need for a very full examination of the patient in any condition, and the various ways of gleaning information from this source are fully exploited.

The illustrations to the text are the weakest point of the book. Most of them have been borrowed from other books on physical signs and have lost a great deal of their attractiveness in that they are line drawings from photographs. Many are definitely out of place; for example, the illustrations of patients with such rare conditions as desmold of the *rectus abdominis* muscle, rupture of an aneurysm of the ascending aorta into the superior *vena cava*, tumour of the carotid body *et cetera*, should not be included in a book on elementary diagnosis. Those illustrations which show how to examine various organs and systems are good, but there are not nearly enough of them.

SURGERY FOR THE NURSE.

A Manual of Surgery for Nurses. By C. WELLS, M.B., F.R.C.S.; 1938. Edinburgh: E. and S. Livingstone. Crown 8vo, pp. 417, with illustrations. Price: 10s. 6d. net.

THE title of Dr. Wells's book at once denies that its object is to teach how a surgical patient should be nursed. Its object, as the author points out, is to introduce the subject of surgery to the nurse, who, perforce, has "a mind unprepared by years of preliminary

study as is the mind of the medical student". We agree wholeheartedly with the author in his purpose. Nurses cannot be taught by lectures how to care for a surgical patient. This knowledge can be acquired only by practice and practical tuition in the wards. They will, however, not become efficient in this respect if they are ignorant of the main effects of disease, and of the means whereby disease is defeated surgically.

Each chapter on the various systems begins with a short description of the anatomy and physiology of the organs contained in that system. The symptoms and signs of disease are dealt with shortly but adequately. The author has wisely stressed the pre-operative and post-operative care of the patient rather than the actual operation in question. There are many excellent diagrams in the book, the print is good, and the text well written and concise. The author points out that the book is not exhaustive, and that he does not believe a book for nurses should be. We agree with him in this respect, and herein lies one of the merits of this excellent little book.

DENTAL APPLICATORS AND THEIR CONSTRUCTION.

The Construction of Vulcanite Applicators for Applying Radium to Lesions of the Buccal Cavity, Lips, Orbit and Antrum. By D. G. WALKER, M.A., M.Dent.Sc., B.Ch., with a foreword by W. W. JAMES, O.B.E., F.R.C.S., L.D.S.; 1938. London: John Murray, for the Middlesex Hospital Press. Demy 8vo, pp. 70, with 23 plates. Price: 7s. 6d. net.

MR. D. G. WALKER has produced a short monograph detailing the mechanical problems encountered during the construction of dental applicators used for the treatment of malignant disease. It is evident that he has brought much painstaking care and considerable ingenuity to his task. The many excellent photographs, descriptively captioned, well illustrate the numerous varieties of apparatus in use; and the principles of construction are briefly described.

The monograph is a useful addition to the literature of radium therapy. It will prove most useful to the mechanic responsible for the construction of such apparatus; but it should be studied by the radium therapist so that the resources of the dental laboratory may be fully utilized.

Unfortunately, the author's English is not above reproach; *inter alia*, he is frequently in trouble with his prepositions. The printing has been well done, and the numerous illustrations adequately exemplify the text.

FRACTURES AND DISLOCATIONS.

Fractures and Dislocations for Practitioners. By E. O. GECKELER, M.D.; 1937. London: Baillière, Tindall and Cox. Medium 8vo, pp. 262, with illustrations. Price: 25s. net.

EXCEPT that he assumes that the facilities of a highly organized fracture service are available to all general practitioners, Dr. Geckeler is to be congratulated on producing a compact, well arranged, adequately illustrated volume in which he covers the ground in a satisfactory manner, and departs only rarely from accepted principles in the treatment of fractures. There is much common-sense advice in the opening chapters on the management of fractures. It is pleasing to read that "the patient is the best physiotherapist", and to find excellent and practical advice on the much neglected subjects of rehabilitation exercises and occupational therapy. It is incredible that the same author should still advise the carrying of buckets of water, passive movement and manipulation under anaesthesia for post-traumatic stiffness of the elbow joint, even in the presence of *myositis ossificans*. The descriptions of the various methods of plaster fixation, splints *et cetera*, are good, and the usual warnings regarding the prevention and recognition of pressure sores are sufficiently emphasized. The author does not hesitate in certain instances to indicate when difficulties and complications are to be expected and to advise in such cases that further expert opinion should be sought. It is surprising that internal fixation of fractures of the femoral neck and some more complicated supracondylar fractures of the humerus are not included in this category.

Average times for immobilization of various fractures are given, and tend to err on the short side, notably in Colles's fractures (three weeks) and Pott's fractures

(six weeks); and most surgeons will agree that barely 50% of fractures of the carpal navicular will unite in four months. In the latter case the importance of a further X ray examination after two weeks in doubtful cases is not mentioned. We do not agree that a caliper should not be used in the treatment of a fractured femoral shaft, that it is necessary to maintain recumbency for two months after the application of a hyperextension plaster jacket for a crush-fracture of a vertebral body, nor that a patient with a simple fracture of the tibia and fibula should not in most cases start weight-bearing after six weeks in a well-fitting, above the knee, plaster cast.

No explanation is forthcoming as to why *débridement* of the wound in a compound fracture should never be done after eight hours, nor does the author apparently agree with Böhler that the improved results in the treatment of compound fractures are due in no small measure to their conversion after thorough *débridement* into closed fractures by closure of the wound. The section on slipped femoral epiphysis (adolescent *coxa vara*) is not up to standard, and should be deleted from subsequent editions.

Altogether the book should prove a very useful guide to the practitioner who is able and willing to give the time and care necessary to carry out the very excellent advice to be found within it. There is a well-selected bibliography of references following each particular section of the book.

EVERYDAY SURGERY.

Everyday Surgery. By L. ROGERS, M.Sc., F.R.C.S., F.R.C.S.E., F.R.A.C.S., F.A.C.S., and A. L. D'ABBEU, M.B., Ch.M., F.R.C.S., with an introduction by G. GREY TURNER, D.Ch., M.S., F.R.C.S., F.R.A.C.S., F.A.C.S.; 1938. London: Edward Arnold and Company. Demy 8vo, pp. 292, with illustrations. Price: 12s. 6d. net.

THERE is an extraordinary amount of information contained in the 280 pages of this little volume, and it has been made possible by a concise and lucid style and by the authors keeping strictly to conditions of common occurrence. It is hardly full enough for students preparing for their final examinations; therefore, its greatest value would be as a surgical primer for students just entering hospital, or for a practitioner who has been out of touch with recent developments and wishes to obtain the latest views on routine practice.

The simple drawings are helpful, but in a book not intended for operating surgeons a drawing illustrating the abnormalities of the cystic artery seems rather unnecessary.

We enjoyed reading the book because of its style, and would like to see an increase in its scope.

OPHTHALMOLOGY AND NEUROLOGY.

Neuro-Ophthalmology. By R. L. REA, B.Sc., M.D., M.Ch., F.R.C.S.; 1938. London: William Heinemann (Medical Books) Limited. Crown 4to, pp. 590, with numerous illustrations and coloured plates. Price: 42s. net.

IN the words of the author, "Neuro-Ophthalmology" is an attempt "to supply an answer to the queries regarding those subjects which form a connecting link between ophthalmology and neurology". There is no need to emphasize the importance to the neurosurgeon of a thorough knowledge of the eye and its central connexions, and in this volume he will find much of interest to him. The author is an ophthalmic surgeon, and draws largely on his own experience as ophthalmic surgeon to the West End Hospital for Nervous Diseases.

The book will serve as a valuable source of reference for those diseases of the central nervous system which affect the eye even remotely. It contains a useful bibliography. Nevertheless, a careless, discursive style and frequent repetition of subject matter help to irritate the reader and make the volume unduly bulky. The neurosurgeon will pay particular heed to the advice given by the oculist on the choice of equipment for the examination of the eye, and we think that in the introductory chapter on the choice of equipment, the author's preference for expensive and complicated apparatus has led him astray. In particular, the non-recording perimeter and Bjerrum's screen cannot be surpassed for accuracy, a fact of which every perimetrist of note is aware; it is disconcerting to find the author recommending the various complicated and expensive

recording instruments, and failing to stress sufficiently the value of accurate, quantitative perimetry. The ophthalmoscopic examination of the fundus is discussed throughout the book, and here again we feel that the oculist, aware of the wide variations in the appearance of the normal fundus, should hesitate a long while before stating that "to miss the discovery of the slightest pallor of the disc is indeed a serious error". It is common knowledge amongst ophthalmic surgeons that the error is usually in the opposite direction, and that the physician's and neurologist's diagnosis of "pale discs" or "temporal pallor" is frequently not confirmed.

Although the book contains many interesting accounts of diseases of the nervous system, it cannot be recommended as an accurate representation of the ophthalmological aspect of the subject.

NEURORADIOLOGY.

A Textbook of Neuro-Radiology. By C. P. G. WAKELEY, D.Sc., F.R.C.S., F.R.S.E., F.A.C.S., F.R.A.C.S., and A. ORLEY, M.D., D.M.R.E.; 1938. London: Baillière, Tindall and Cox. Super royal 8vo, pp. 350, with illustrations. Price: 25s. net.

THE authors have produced a welcome volume. In it the radiological appearances of diseases directly or indirectly affecting the central nervous system are correlated with the corresponding clinico-pathological features.

The radiological anatomy of the skull is discussed first, and this is followed by a detailed presentation of diseases affecting every part of the skull. Radiological techniques are carefully described, and the photographs or diagrams showing the necessary positioning are accompanied by examples of the normal appearances obtained. The illustrations and line drawings in the volume make an outstanding feature, which greatly simplify the reader's task.

The subject matter is systematically approached, and relevant anatomical and pathological details are clearly correlated. The resultant effect is a comprehensive discussion of cranial disease, the keynote of which is the nature of the aid which the radiologist can give in diagnosis.

It is with diffidence that any part is singled out for commendation, but the chapters on cerebral arteriography, ventriculography and encephalography are of particular interest at the present time, and these pages have been well written.

The authors conclude with two chapters, one on lesions of the spine and spinal cord, the other on systemic neuropathic disturbances. These are not so complete as previous sections, and thus lose much of their usefulness. Tumours of the spine are dismissed in a page and tuberculous disease in a paragraph.

The book is printed in clear type on fine paper, but the number of typographical errors is too great. The authors deserve praise for their efforts in the production of this volume. The great variety of the subject matter and the extensive bibliography record the industry which produced it. The book is recommended to the attention of neurologists and neurosurgeons. It will prove of great help to the radiologist.

MENINGIOMATA.

Meningiomas: Their Classification, Regional Behaviour, Life History and Surgical End Results. By H. CUSHING, M.D., with the collaboration of L. EISENHARDT, M.D.; 1938. Baltimore: C. C. Thomas. Crown 4to, pp. 799, with numerous illustrations. Price: \$15.00 net.

THE appearance of this volume by Harvey Cushing cannot fail to attract the attention of surgeons and physicians who are interested in the diagnosis and treatment of diseases of the nervous system.

The title of the book is apt to be misleading, since the reader would gather that the volume is devoted exclusively to a group of tumours which are comparatively rare, and which are usually the province of specialist neurosurgeons. Those who are acquainted with Cushing's writings will realize that in the 785 pages of this volume a wealth of information on all kinds of intracranial and spinal lesions will be available. The qualifications of the author for such a task are unrivalled. The results of a lifetime of intensive study, of ingenious experiment and of faithful recording of experiences

are here related with modesty and literary skill for which the writer is universally admired.

The opening chapter is of great historical interest, and students of nomenclature will find ample justification for the use of the author's simple term "meningiomas". The detailed discussion of the pathology of these tumours is the fruit of long study of many microscopic sections, the close examination of numerous specimens at operation and in the autopsy room, and the long and patient following up of the clinical notes of a large series of patients. A chronological list of 313 meningioma patients is given.

The differential diagnosis of spinal and intracranial tumours is so complete that the book may be regarded as a compendium or encyclopædia of neoplasms of the nervous system.

Beautifully illustrated with 685 photographs and drawings, it may reasonably be stated that it is the most complete neurosurgical work appearing in the English language. No surgeon who operates on the central nervous system should be without it.

The author's views on the origin of many intraventricular tumours are based upon long experience and careful study, and while they are not shared by all American neurosurgeons, they are entitled to the greatest respect. An incontrovertible case is presented for the origin of many of these tumours from the infolded arachnoidal tissue about the chorioid plexus. Similarly, intracerebral meningiomata are explained by their development from arachnoidal cell nests in the great fissures of the brain. Operators who choose this field for their endeavours may be consoled by the many candid confessions of failure and disappointment related by the master surgeon. The early experiences of the author, before the days of the electro-surgical knife, when multiple operations on the same patient were frequently the rule, are a tribute to the tenacity of the surgeon as well as to the unbounded faith of the patients.

Whilst optimism is justified in most cases of established meningiomata, a warning is noted in two classes of tumour, the basillar groove type and the gassero-petrosal tumours. Of the latter the author remarks that "an operation, either from above or below, is more likely to hasten the inevitable end than to prolong life or alleviate symptoms; decompressive procedures . . . are without avail".

Another warning is of interest: "The employment of electro-surgical methods of dissection in and around large blood vessels is highly dangerous for the tyro and has introduced into craniocerebral surgery new elements of risk." Nevertheless: "Since the introduction of electro-surgical methods in 1927, the case mortality has been considerably lowered."

The survival of patients in the author's series for twenty-five years following operation is an indication of the benign nature of this group of neoplasms.

On the other hand, recurrences are recorded. One such case, a heroine of the story, was operated upon seventeen times. In describing his harrowing experiences with this patient, Cushing is at his best, combining the true scientist—observing, recording, experimenting—with the great-hearted doctor—the fine flower of American surgery.

The description of operative technique needs no embellishment. The finished art of the operator has become a byword in contemporary surgery and a standard which most neurosurgeons constantly strive to emulate.

The bibliography is extensive; 531 original references are noted. Strongly bound and carefully indexed, the volume is full of interesting matter, entertaining to all practitioners of medicine, but a veritable vade-mecum for the neurosurgeon. Doubtless, it will long remain a classic and a practical guide book for those who undertake the difficult business of the diagnosis and treatment of intracranial tumours.

ANATOMY OF THE HEAD AND NECK.

Surgical Anatomy of the Head and Neck. By J. F. BARNHILL, M.D., F.A.C.S., LL.D., with an introduction by P. S. McKIBBEN; 1937. London: Baillière, Tindall and Cox. Imperial 8vo, pp. 936, with 431 illustrations, of which many are in colour. Price: 90s. net.

Nobody will deny that the subject of anatomy has definitely come into its own once more. He is a bold man who now sets any limits to anatomical knowledge which may become relevant in modern surgery. It is natural that attempts are made periodically to dispense with the tedious drudgery necessary to acquire a sound knowledge of anatomy by dissections. It is nevertheless true that there are few short cuts for serious students of anatomy.

In recent years there have been attempts to make the teaching of anatomy more attractive by paying attention to fundamental principles so that memory work may be lessened. Another method has been the frequent use of illustrations and photographs, and the many excellent anatomical atlases bear witness to the amount of skill that has been available in this direction. It is, of course, needless to say that anatomy cannot be learned from pictures. There is no substitute for dissections. The pioneers of the study of anatomy were all ardent dissectors; many of them as a routine spent a couple of hours in the dissecting room day after day during the whole of a long lifetime. As this is obviously impossible for the greater number of surgeons, perhaps the next best thing is a comprehensive pictorial representation of anatomical structures.

This book, by Professor Barnhill, is an attempt along these lines, and we must say that it is a very successful one. The plan of the book, as adequately described in the preface, has much in it that is original, and most of the illustrations are drawings of actual dissections made by the author or his students. As Professor Barnhill was actively engaged in surgical practice of oto-rhino-laryngology, it is inevitable that the book contains much that is useful and practical in this specialty.

The first half of the book is devoted to descriptions of the structures and their surgical significance. Many standard operations are described in detail. Like a wise teacher, the author does not despise the use of mnemonics, even lapsing into verse for the cranial nerves.

The second half of the book consists of all the illustrations grouped together, with no letterpress except their legends. Many of these diagrams represent quite original dissections by Professor Barnhill and his students and are faultlessly reproduced.

There is no doubt that this text book will be attractive to a certain type of student, and may be of great value to the surgeon who practises this specialty. We compliment the author on his venture. The book is beautifully produced by Baillière, Tindall and Cox, and we thoroughly recommend it.

PÆDIATRICS.

Management of the Sick Infant and Child. By L. PORTER, B.S., M.D., F.R.C.S., L.R.C.P., and W. E. CARTER, M.D.; Fifth Edition, revised; 1938. St. Louis: The C. V. Mosby Company. Melbourne: W. Ramsay (Surgical) Proprietary Limited. Royal 8vo, pp. 874, with illustrations. Price: 63s. net.

THE study of sick children is a fascinating task. A successful pædiatrician must be endowed with a keen clinical sense as well as a sound knowledge of those laboratory methods which can aid him in making a diagnosis. Moreover, in view of the rapid advances in medicine and surgery, he must be wise in the choice of his treatment, for he has many methods at his disposal.

Readers of the fifth edition of "Management of the Sick Infant and Child", by Porter and Carter, must be impressed by the authors' sound knowledge of their subject. They have successfully combined with the more recent advances in medicine the basic principles of pædiatrics gleaned from their great teachers, Holt, Howland and Marriott.

A critical outlook is maintained throughout, the chapter on breast feeding affording an excellent example. The authors point out that artificial feeding has now reached such a state of advancement that natural feeding is no longer an absolute essential. It must be recognized that the mother of today may live in such a sea of mental stress that she is unable to feed her infant. She must then be advised by the attending physician to seek the aid of artificial feeding, and she must be shielded from the scorn of her lay advisers.

The section on pneumonia is full of interest and refers to the use of anti-pneumococcal serum, the construction of a satisfactory oxygen tent, and the help which may be obtained from radiography in the making of an early diagnosis.

The book is planned principally for the physician, but there is much which can be read with enjoyment and benefit by the surgeon. In the chapter on chronic pyelitis the authors urge the importance of recognition that a congenital abnormality of the renal tract may be the underlying cause and should be sought by retrograde or intravenous pyelography. Some of these structural anomalies are amenable to surgery. Porter and Carter will surprise most Australian surgeons by advocating very early operation for the repair of cleft palate. They state that the optimum time for operation

is between the second day and the twelfth week of life. In Australia a hare-lip is usually operated upon at about three months, a cleft palate at two years.

We cannot agree with their attitude toward splenectomy in acholuric jaundice. Although they admit the benefits of the operation, they state that "no child should be splenectomised unless the crises are alarmingly severe and very frequent". It is the usual practice in Australia to remove the spleen even if the symptoms are relatively mild. The authors discuss the use of X ray therapy as an alternative, but they rightly consider that the efficiency of this method of treatment is still *sub judice*.

The book concludes with excellent chapters on the use of drugs, the selection and preparation of diets, and finally a chapter on "methods". This last is a triumph for both authors and publishers. The various clinical procedures which the physician or surgeon may find it necessary to undertake in the treatment of the sick infant are presented to the reader in a clear and simple manner by means of illustrations. Even if one were to ignore the merits of the remainder of the book, this chapter alone would make it a close friend both of specialists in diseases of children and of practitioners of general medicine who may be confronted with such problems as lumbar puncture, aspiration of a chest, the strapping of an umbilical hernia or the administration of physiological fluids by the intravenous route.

THE SUPRARENAL GLAND AND SEX.

The Adrenal Cortex and Intersexuality. By L. R. BROSTER, C. ALLEN, H. W. C. VINES, J. PATTERSON, A. W. GREENWOOD, G. F. MARRIAN and G. C. BUTLER; 1938. London: Chapman and Hall Limited. Australia: Angus and Robertson Limited. Crown 8vo, pp. 257. Price: 22s. 6d. net.

IN 1933 Vines and Broster published a monograph dealing with their observations on women in whom the operation of unilateral adrenalectomy had been performed for the relief of symptoms of virilism. By means of a special differential staining method (Ponceau-Fuchsin stain) it was shown that in virilism the cytoplasm of certain cells in the suprarenal cortex stained a vivid red colour in contrast to the blue reaction observed in normal individuals.

This phenomenon, together with the beneficial effects of unilateral adrenalectomy, suggested that the cortical cells elaborated a secretion closely allied to the male sex hormone. Backed by a research grant by Lord Wakefield to the Charing Cross Hospital, a team of research workers collaborated to investigate the problem of virilism. Their results and conclusions are set out in this very instructive monograph.

The biochemical aspect of the problem was studied by Patterson and Greenwood in England and by Marrian and Butler in Toronto. The urine of eleven out of fourteen persons suffering from adrenal virilism and selected for operation gave positive results when tested for the presence of free male sex hormone. In general, following operation there was an immediate reduction in the excretion of this hormone. In addition, the Toronto workers isolated a completely new substance, pregnane 3.17.20 triol ($C_{27}H_{48}O_3$), from the urine of female patients exhibiting virilism. This new compound did not occur in the urine of normal females. In this connexion it is interesting to note that Reichstein isolated from the suprarenal cortex several hormone fractions possessing androgenic activities.

The first section of "The Adrenal Cortex and Intersexuality" is concerned with the clinical and surgical aspect of the adreno-genital syndrome. Indications for surgical interference, together with operative procedures, are discussed. Instructive records of some thirty-three cases are presented. It is interesting to note that after operation there is a tendency towards the disappearance of acquired male characteristics and towards a return to the feminine form and functions. Although the author of this section, L. R. Broster, is obviously an enthusiast on his subject, it is refreshing to find that his facts and opinions are presented in a logical and restrained fashion. In fact, the same may be said for the authors of the subsequent sections of this work.

In Section B, Clifford Allen discusses the influence of endocrine and psychical factors in the determination of sexuality. Although adrenal dysfunction may lead to an abnormal sexuality, the author emphasizes the fact that in many instances it is not possible by any stretch of the imagination to ascribe the condition to an endocrine

factor. He considers with Zuckerman "that there are two elements in sexuality. There is a psychical one and an endocrine one. The sexual hormones that appear at puberty are a means of reinforcing a psychical sexual machinery." Those cases of abnormal sexuality in which no evidence for an endocrine basis can be detected, may be curable by psychotherapy. An extensive series of case histories is given in support of the author's opinions.

In the pathological section, H. C. Vines deals with histological observations on the suprarenal cortex. As a result of such studies he considers that the suprarenal cortex acts as a bisexual accessory sex gland in the normal mechanism of sex development. It is suggested that the adrenal cortex, under the control of the anterior pituitary, secretes both androgenic and oestrogenic hormones. From histological observations, Vines considers that, owing to a short period of androgenic activity in the suprarenal cortex, together with a normal oestrogenic period, an element of heterosexual instability is introduced in the female organism. In the male no comparable oestrogenic period occurs and therefore it is rarer to find heterosexual changes in that sex. Although Vines has put forward an extremely interesting hypothesis, he is careful to state that a considerable amount of investigation still requires to be done before the complete adreno-cortical mechanism can be understood.

The work, presented as a whole, is a stimulating example of what can be achieved by team work, and should prove of great interest and help to those interested in this particular branch of endocrinology and psychology.

Proceedings of the Royal Australasian College of Surgeons.

PATHOLOGICAL DEMONSTRATIONS AND EVENING MEETINGS.

THE Councils of the Royal Australasian College of Surgeons and the Royal Australasian College of Physicians jointly arranged for Dr. H. E. Robertson, Professor of Pathology, University of Minnesota (Mayo Foundation), head of the Section of Pathologic Anatomy at the Mayo Clinic, to deliver a series of lectures during his visit to Melbourne in January, 1939. The following subjects were presented:

Thursday, January 19, 1939, at 2.15 p.m., at the Royal Melbourne Hospital: Pathological demonstration, "Tumours of the Kidney".

Friday, January 20, 1939, at 2.15 p.m., at Saint Vincent's Hospital: Pathological demonstration, "Ulcerative Colitis".

Friday, January 20, 1939, at 8.15 p.m., in the College Lecture Hall: Lecture, "Duodenal Ulcer".

A large attendance was present at all the meetings.

CONGRESS OF THE PAN-PACIFIC SURGICAL ASSOCIATION.

A CONGRESS of the Pan-Pacific Surgical Association will be held in Honolulu on September 15 to 28, 1939.

This will be the third meeting of the Pan-Pacific Surgical Association, the two former meetings having also been held during 1929 and 1936 in Honolulu. An invitation is extended to all surgeons to meet in Honolulu outstanding men from countries of the Pacific area, including Australia, New Zealand, China, Japan, Java, Canada and the United States of America, for an interchange of surgical thought and for the purpose of bringing about better understanding through personal contact among the surgeons of these countries.

There will be sections in fractures and orthopaedics, general surgery, gynaecology, motion pictures, neurosurgery, ophthalmology, oto-laryngology, Röntgenology, plastic surgery, thoracic surgery and neurology, with outstanding men as chairmen for the United States of America and equally prominent men as chairmen for the Australasian section. The congress affords not only participation in interesting scientific papers, but a most enjoyable vacation in the "Paradise of the Pacific".

Communications for information should be directed to Frederick L. Reichert, M.D., Stanford University Hospital, San Francisco, programme chairman for the United States of America; Howard Updegraff, M.D., 6777 Hollywood Boulevard, Los Angeles, programme vice-chairman; Forrest J. Pinkerton, M.D., secretary-treasurer of the association, Young Building, Honolulu, Hawaii; or H. G. Wheeler, secretary, Royal Australasian College of Surgeons, Spring Street, Melbourne.

Notices.

THE BRITISH POSTGRADUATE MEDICAL SCHOOL.

THE College wishes to draw attention to the announcement of the British Postgraduate Medical School on page xxxiv of the advertisements.

NEW DEVELOPMENTS IN SURGICAL EQUIPMENT.

THE attention of Fellows is drawn to pages xx and xxx among the advertisements, which illustrate some recent developments in surgical equipment. The Editorial Committee is responsible for the selection of the equipment illustrated thereon. The publishers will be pleased, whenever possible, to supply the names and addresses of the manufacturers to anyone requiring such information.

Editorial Notices.

EDITORIAL communications should be addressed to the Chairman of the Editorial Committee, 57 Collins Street, Melbourne, or to any member of the Editorial Committee. It is understood that original articles forwarded for publication are offered to THE AUSTRALIAN AND NEW ZEALAND JOURNAL OF SURGERY solely, unless the contrary be stated.

Reprints can be supplied at cost price; the minimum number is fifty copies. Orders for reprints must be given when the proof is returned.

Exchange journals should be addressed to the Honorary Librarian, Royal Australasian College of Surgeons, Spring Street, Melbourne, C.I., Victoria, Australia.

Business communications and remittances should be addressed to Butterworth and Co. (Australia) Ltd., 8 O'Connell Street, Sydney.

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